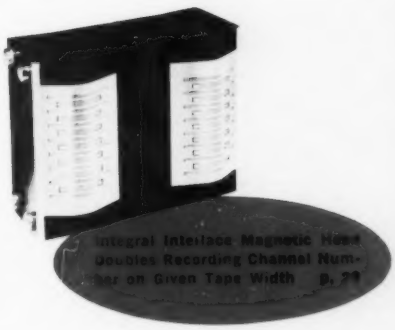
JUNE 1960

ELECTRONIC PRODUCTS

MAGAZINE
and **CLIP/FILE**

Microminiature Transistors Permit 16 Times Greater Component Density p. 32



Integral Interlace Magnetic Head Doubles Recording Channel Number on Given Tape Width p. 71

Portable Transistorized Temperature Compensated Power Meter Offers Unusual Stability. p. 14

Miniature Black Body Source For Infrared Calibration p. 18

THE INDUSTRY'S NEW PRODUCT MONTHLY

FEATURING: Specs • Applications • Availability • Prices

eem File System Sec. 4000
electronic engineers master

TRANSISTORIZED POWER SUPPLIES IN A NEW HIGH POWER RANGE

MODEL SM36-15M

UP TO 30 AMPS. DC AT 14 VOLTS

UP TO 325 VOLTS DC AT 2 AMPS.

MODEL	DC OUTPUT VOLTS	DC OUTPUT AMPS.	REGULATION * LOAD 0-MAX % or △V		REGULATION * 105-125 LINE %	RIPPLE (RMS)	OUTPUT IMPEDANCE OHMS DC–1KC	OUTPUT IMPEDANCE OHMS MAX. 1KC 100KC	DIMENSIONS W	DIMENSIONS H	DIMENSIONS D*
SM14-30	0-14	0-30	0.1	3 mv.	0.1	1 mv.	0.001	0.01	19"	8¾"	13⅞"
SM36-15	0-36	0-15	0.1	3 mv.	0.1	1 mv.	0.005	0.05	19"	8¾"	13⅞"
SM75-8	0-75	0-8	0.1	3 mv.	0.1	1 mv.	0.01	0.1	19"	8¾"	13⅞"
SM160-4	0-160	0-4	0.1	10 mv.	0.1	1 mv.	0.08	0.8	19"	8¾"	13⅞"
SM325-2	0-325	0-2	0.1	10 mv.	0.1	1 mv.	0.3	3.0	19"	8¾"	13⅞"

write for complete specifications

*behind panel

- ▶ Line/Load regulation, Stability: Less than 0.1%.*
- ▶ Recovery time: 50 microseconds.
- ▶ Operational Simplicity: No optimizing controls, range switches.
- ▶ Output Voltage control continuously variable from 0 to maximum.
- ▶ Remote error sensing feature provides means of maintaining regulation directly at load.
- ▶ Meters optional. To specify metered units, add "M" to Model Nos. given in table.
- ▶ Moderately priced.

*0.01% REGULATION ON SPECIAL ORDER

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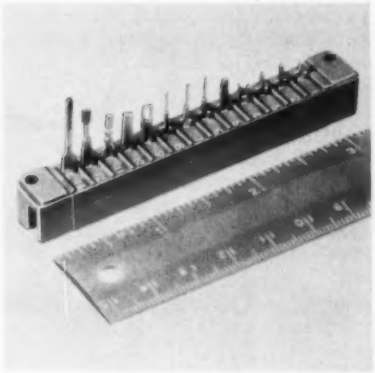
JUNE 1960 • VOL. 1, NO. 6

ELCO OPEN-END PRINTED CIRCUIT VARICON CONNECTORS, SERIES 5009

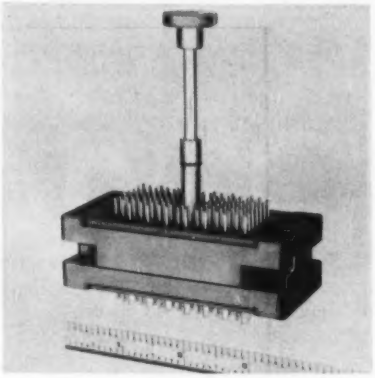


Elco's newest contribution to the science of printed circuitry is this open end Varicon Connector. It is particularly applicable where the module card edge dimension exceeds the length of the connector. The "straight through" design eliminates necessity of notches or cut-outs. Mounting of the connector may be accomplished on the chassis or on the printed circuit mother board. The connector accommodates 3/32" thick module card and is available in 13 or 22 contact units, with many different contact terminations. Glass filled diallyl phthalate insulator offers high insulation resistance and dielectric strength characteristics. Some of the numerous types of Varicon contacts which may be utilized with Series 5009 are shown in the photograph.

Write Elco Corp., Phila. 24, for Details

SEC. 2100

ELCO RACK-AND-PANEL OR CABLE CONNECTORS SERIES 8007-8008

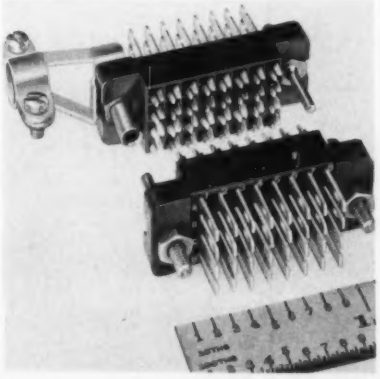


The industry's most versatile and reliable connector, the Varicon, with wiping action mating principle, here applied in a connector providing highest contact density. Series 8007: with screw actuating device to provide positive lock against vibration plus easiest engagement and disengagement; available with 75, 100, 130 contacts. Series 8008: without screw actuating device, available with 80, 95, 110, 125, 140 contacts. Both Series available with or without cover. Contacts and contact rows at .150" spacing. Both Series have male guide pin and female guide socket to align connectors properly. Each pin and socket, in addition, is designed to permit 6 mounting and therefore 36 polarizing positions; with a theoretical possibility of over 100 polarizing positions. A hold-down device also available with Series 8008.

Write Elco Corp., Phila. 24, Bulletin 115

SEC. 2100

ELCO HIGH-DENSITY MICRO-MINIATURE VARICON RACK-AND-PANEL CONNECTORS, SERIES 8105



Varicon connectors assure users of this new series highest reliability and low contact resistance during the entire life of the equipment. Series 8105 is of hermaphroditic design, with mating insulators exactly alike except for contact numbering. Mating contact area extends 50% above insulator surface and 50% below it. Connector shown has 4 row of eight contacts; .100" spacing between contacts, .125" between rows. Other sizes also available upon order Contacts are identified on sight by letters for rows, numbers for columns. Various contact terminations can be selected. Connector can be equipped with cable clamp for side or top mounting. Each connector half is equipped with guide pin and guide socket. For complete details and specs . . .

Write Elco Corp., Phila 24, Bulletin 118

Editor's Notes:

Looking Over the Month's New Products

One of the many new product items of more than usual interest this month came from the Lansdale Division of Philco. Their new **Micro-miniature Transistor Enclosure** (p. 32), intended to house specific transistors for computer use, **will permit component densities on the order of one million parts per cubic foot.** Cold welded, this package predicates ruggedness and reliability of a very high order—but, will someone tell us how they wire up a million of anything per cubic foot?

* * * *

Want **two tracks for tape recording where only one grew before?** See Clevite's **Integral Interlace Magnetic Heads** (p. 28) which offer just about that for analog and digital recording — higher signal-to-noise ratio, too.

* * * *

Changes in ambient temperature have no deleterious effect on measurement of r-f power with FXR's new **Portable Transistorized Temperature Compensated Power Meter** (p. 41). A second, and identical, temperature sensitive element mounted in proximity with the main power measuring element in the thermistor head accomplishes this desirable feature.

* * * *

Perkin-Elmer's new **"Black Body" Source** (p. 18) for **calibration of infrared radiation** achieves a fully proportional temperature control when the new miniature infrared source is used in conjunction with P-E's temperature controller.

* * * *

Combining a conventional multimeter with a continuous reading meter-relay, Assembly Products comes up with a first in its new **Controlling Multimeter** (p. 12). The device should **provide new highs in automated control in lab and industrial applications.**

* * * *

We may have an answer to **handling the tiny parts or equipments** which are flooding in, in Penfield's **Eductor Tube Pickup** (p. 28) which promises to pick up, and release, the most minute parts around.

You can pick up vital information on the newest of the new products from the guide below.

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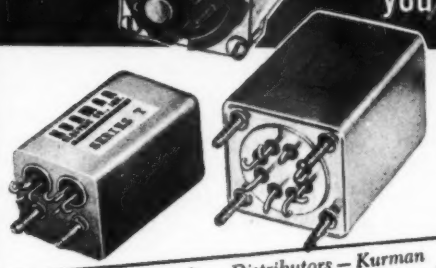

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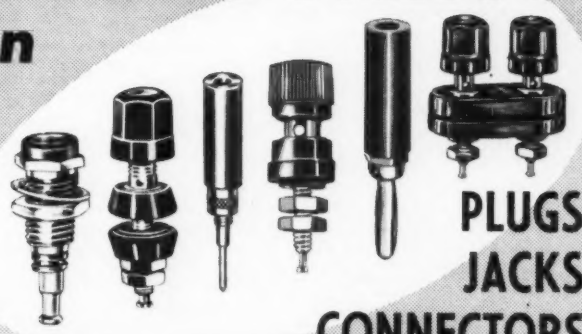

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New Products of the Month

WIDE BAND DISTRIBUTED AMPLIFIER [*Community Engineering Corporation*]

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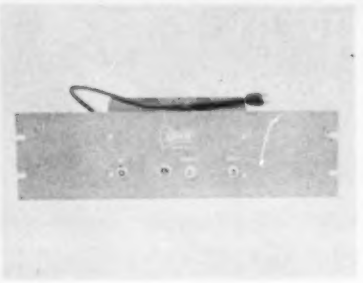

Flat Frequency Response—Bandwidth 10MC to 90MC—Gain 40DB

The Model 1004 is a new Wide Band Distributed Amplifier capable of amplifying sine waves, symmetrical signals, or very fast pulses. Wide bandwidth, high output and flat frequency response (±1.5db) are featured. No adjustments are required.

The unit incorporates a specially designed and constructed printed circuit board holding interwiring capacitances to a minimum. Silver plated double thick copper foil on glass epoxy is used for high strength and superior electrical characteristics.

This rack mounted amplifier is carefully shielded to eliminate radiation. The easily removable dust covers protect the unit and self contained power supply. The device operates from a 105-125 VAC, 50/60 cycle power source.

Bandwidth is 10 mc to 90 mc and phase response is substantially linear within the pass band. Gain is 40 db nominal, with a noise figure of better than 8.5 db at 85 mc. Amplifier delay is approximately .03 microseconds. Tube failure due to emission does not render the amplifier inoperative but merely attenuates the gain by about 3 db. Input and output impedance is 300 ohms.

PRICE: $195.00; **AVAILABILITY:** 3 to 4 weeks
MFR: Community Engineering Corp., P.O. Box 824, Dept EP, State College, Penna.
SALES OFFICES: See **eem** p. 1555 (1960-61 Ed.)

Check 40 Reader Service Card 6/60

MINIATURE TRIMMER CAPACITOR [*Corning Glass Works*]

eem File System electronic engineers master Sec. 1500

Provides Linear Tuning At The Rate Of .4 μμf Per Turn

Providing linear tuning at the rate of .4 micromicrofarads per turn a new Miniature Trimmer Capacitor has been added to this firm's line.

Four models are available each designed for panel mounting, with capacitance ranges of 1 to 4.5, 1 to 8.5, 1 to 12 and 1 to 18 μμf. Behind panel lengths are 2⅞₄, 5/8, 1¾₄ and 1½ inch.

A newly designed direct traverse mechanism provides absolute torque control, eliminates backlash and will compensate automatically for wear that might result from frequent tuning, the maker says.

Metal parts are made of invar and brass to attain a temperature coefficient of capacitance of ±50 ppm/°C. Silver plating provides minimum corrosion resistance as well as a minimum Q factor of 500 at 50 megacycles. Dielectric strength is 1500 volts or higher at all positions.

The trimmer will have application in systems requiring high quality and small size, such as airborne transmitters, computers and communications receivers.

PRICE: Contact Sales Offices below
AVAILABILITY: From stock
MFR: Corning Glass Works, Dept EP, Corning, N. Y.
SALES OFFICES: See **eem** p. 1559 (1960-61 Ed.)

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POLYETHYLENE COPOLYMER CASTING RESIN [*Emerson & Cuming, Inc.*]

eem File System electronic engineers master Sec. 1600

Insulation Material For Microwave, Waveguide, Coax Components

Designated as Stycast TPM-5, this new polyethylene copolymer resin is a one part system (no catalyst addition is required) distinguished by its extremely low dissipation factor. It is very simple to use, maker states. The fully cured casting has physical and electrical properties similar to those of high density polyethylene; however, its high temperature properties are improved. Stycast TPM-5 is thermoplastic but has been used well above 225°F. If high temperature use is desired, the cured product should be confined to prevent gradual flow.

The resin is a pure hydrocarbon and, therefore, has found use in nuclear shielding installations. It is much simpler to use than polyethylene sheet in fabricating a shield.

Shrinkage on cure is quite small. Embedments should be so designed that the resin does shrink down onto surfaces it is intended to seal. In this manner, moisture seals to metals, plastics, and ceramics are possible. The resin is unsurpassed in moisture resistance, compared to conventional casting resins.

PRICE: $3.50 per pound, (1 gallon can); Wt. 7 lbs/gallon; $3.10 (5 gallon pail)
AVAILABILITY: From stock
MFR: Emerson & Cuming, Inc., Dept EP, Canton, Mass.
SALES OFFICES: See **eem** p. 1580 (1960-61 Ed.)

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POCKET RADIO [*General Electric Co., Communication Products Div.*]

eem File System electronic engineers master Sec. 1900

Weighs Only 12 Ounces, Including Battery

A new all-transistorized shirt-pocket personal radio communications receiver, with miniaturized circuitry that boosts audio efficiency and requires 35% less battery power than previous hand-carried message equipment of this type, has been introduced by this manufacturer.

When on standby, ready to receive a call, the "Voice Director" uses only 32.5 mw (5 ma at 6.5 v). While a message is being received, the power drain is 58.5 mw.

Designed for indoor and outdoor voice-paging, key personnel may be contacted by a base station transmitter, a two-way radio in a car, or by a portable unit. The receiver uses a single 6.5 volt, mercury battery. A ferrite loop-stick antenna is built into the receiver's case.

A directive horn is clipped to the wearer's lapel when privacy is not required and when loudness of the receiver will not disturb others in the vicinity. It is not necessary to hold the horn to the ear to hear the message. When listening privacy is desired an ear-piece may be used. Volume and squelch controls are provided.

PRICE: $345.00; **AVAILABILITY:** Stock to 45 days
MFR: General Electric Co., Communication Products Div., Dept. EP, Lynchburg, Virginia
SALES OFFICES: See **eem** p. 1594 (1960-61 Ed.)

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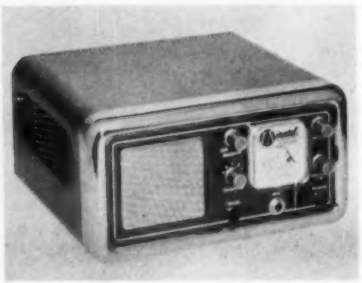
CITIZENS BAND EQUIPMENT [*Miratel, Inc.*]



Transmitter And Receiver Unit—5 Crystal Controlled Channels

Model CR117, a new professional Citizens Band Equipment, consisting of a deluxe transmitter and receiver unit has been added to this manufacturer's line. Some specifications follow:

Receiver:
Type; Superhet—5 crystal controlled channels
Sensitivity; Better than .5 μv
Signal Meter; Reads input levels as low as 1 μv
Selectivity; Two 455 KC IF stages
Tuned Circuits; All inductively coupled to insure selectivity and image rejection
Squelch; Opens on .25μv
Audio Output; 5 watts in 3.2 ohms
Noise Limiter; Self adjusting series gate
Automatic Volume Control; All RF and IF stages

Transmitter:
Oscillator; Overtone — 5 crystal controlled channels
Driver Amplifier; 6CL6 (modulated drive)
Modulator; Class "B" (better than 7½ watts audio power)
Modulation Meter; Signal meter switches on transmit to indicate % of modulation and transmitter carrier output.

PRICE: $229.00; **AVAILABILITY:** 3 to 4 weeks
MFR: Miratel, Inc., 1080 Dionne St., Dept EP, St. Paul 13, Minn.
SALES OFFICES: See **eem** p. 1641 (1960-61 Ed.)
OTHER PRODUCTS: See **eem** pp. 555, 661, 1160

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select the plan tailored to your

WESCON SELLING NEEDS

For the first time in electronic advertising history you can buy **regional** and **national** display advertising in the same issue. Your ad message in **ELECTRONIC PRODUCTS Magazine** can saturate the 11 western states that draw the greatest WESCON attendance... or the whole country. Whichever plan you select, you pay only for the coverage you receive. And of course, the rates are the lowest of any publication serving the electronic industry.

REGIONAL PLAN: 24,000 circulation in the 11 western states (regular circulation 14,000 plus 10,000 Show distribution). Page rate: $395. per page.

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August Wescon Issue Closing Date - July 1st

For further information, contact our local district manager.

ELECTRONIC PRODUCTS Magazine

RIDER BOOKS...

DESIGN, RESEARCH AND PRODUCTION "TOOLS" THAT EVERY ENGINEER MUST HAVE!

BASICS OF GYROSCOPES ('Pictured-Text' Course)

by Carl Machover — 2 Volumes

This book is written primarily for the non-specialist: not for the gyro engineer, but for the student, technician, or engineer who comes in contact with the gyroscope in his studies or work. The text is primarily descriptive and mathematics are kept to a minimum. Only a basic knowledge of algebra and trigonometry is needed for an understanding of the material.
The material upon which this book is based has been proven successful in teaching engineers, technicians and technical sales people at one of the nation's leading gyroscope firms.
Every effort has been made to keep the book technically accurate, while simplifying all explanation. Much of the material in this book, such as the sections on stable platforms, and error sources has never appeared before in book form. It is up-to-date and some of it has only recently been declassified.

CONTENTS: VOL. I—What a Gyro is . . . How it works . . . Vertical Gyro . . . Vertical Gyro Components . . . Directional Gyro.
VOL. II—The Rate Gyro . . . The Integrating Gyro . . . Stable Platforms . . . Inertial Navigation . . . Difficulties of Gyro Construction . . . Other Gyro Applications.

#257, 2 vols., soft cover, **$6.60**; #257H, cloth, **$7.75**.

FUNDAMENTALS OF TRANSISTOR PHYSICS

by Irving Gottlieb, P.E.

An extremely thorough analysis of the action in transistors. While circuit operation is secondary, the book will generate a complete understanding of transistor operation in circuits. The book makes the subject crystal clear without depending upon mathematics for explanation.

CONTENTS: Atomic Physics; Electrical Conduction: Transistor Action; Transistor Structure and Materials; Biasing the Transistor; The Three Transistor Amplifier Circuits; Related Semiconductor Devices. #267, **$3.90**.

BASICS OF INDUCTION HEATING ('Pictured-Text' Course)

by Chester A. Tudbury—2 Volumes

With dramatic force, pictorially and verbally, this two volume 'Pictured-Text' course makes it easy for you to understand the fundamentals of induction heating—what it is and how it works. It describes and explains the operation of the more common types of induction heating machines in use today; presents material to assist in developing a quantitative understanding for new applications and it deals with electrical and thermal aspects in detail and touches upon some of the mechanical problems associated with fixturing (holding workpieces of different sizes and shapes).

The book uses many worked-out numerical examples to make induction heating techniques and

#247, 2 vols. soft cover, **$7.80**; #247-H 2 vols. in one cloth binding **$8.90**.

ENCYCLOPEDIA ON CATHODE-RAY OSCILLOSCOPES & THEIR USES (2nd EDITION)

by John F. Rider & Seymour Uslan

The second edition of the extremely useful book—has been expanded to include the new types of oscilliscopes and their applications. It is completely up-to-date!

Whatever your field—geophysics, aviation, automotive, medical research, television, audio, computers, automatic control or any other branch of industrial and communication electronics—you'll find the cathode-ray oscilloscope today's basic instrument.

This 23 chapter (1300 pages) volume covers all construction and operating details of the tube-gun-deflection electrodes—screen; all the circuits used in oscilloscopes with explanations of circuit functions; specifications and schematics of American and foreign oscilloscopes; adjustment and application in all areas of use.

It covers the latest in special purpose cathode-ray tubes, new data on probes, related information on scope photography, pulse measurements, square wave testing. #133, 1300 pp., 8½ x 11", **$27.00**

BASIC ULTRASONICS ('Pictured-Text' Course) *by Cyrus Glickstein*

Your progress in electronics requires an understanding of ultrasonics—the new tool of industry. This book utilizing the famous Rider 'pictured-text' technique, makes the subject of ultrasonics completely understandable.

GENERAL THEORY—What is Ultrasonics?; Nature of Sound Waves; Why Ultrasonic Waves are Used; Table of Frequencies and Applications.
EQUIPMENT—Basic Units of Ultrasonic Equipment; Types of Ultrasonic Generators; Transistors in Ultrasonics; Pulsed Output; Ultrasonic Transducers; Curie Temperatures; Equivalent Transducer Circuit; Comparative Transducer Types and Characteristics; Associated Equipment.
APPLICATIONS—General Applications; Typical Echo-Ranging Applications, Basic Sonar Principles; Nondestructive Testing; Ultrasonic Cleaning, drilling Soldering, Welding.

#259, 1 Vol. soft cover **$3.50**, #259H, Cloth, **$4.40**

Author provides practical design problems and solutions that work!

DESIGN OF TRANSISTORIZED CIRCUITS FOR DIGITAL COMPUTERS

by Abraham I. Pressman, M.S.

This new book, by the well-known authority in the field of digital computer circuit design, has been acclaimed by engineers for its improved, miniaturized circuit design for digital computers. Any circuit design engineer can acquire a firm knowledge of the principles and practices of designing transistorized digital computer circuits from this authoritative text. The book is primarily concerned with design of computer building blocks using transistors. Particular stress has been placed on the most important building blocks..."And" gates, "Or" gates, Flip Flops, and interconnecting chains of such blocks.

To be of greatest general utility, the author employs "worst-case" design techniques. "Worst-Case" design is absolutely essential for digital type circuits, as these are of the nature of all or none circuits, and single errors even over long periods of time cannot be tolerated. His design considerations permit circuits to work when all supply voltages, resistors, passive components, and all transistor as well as diode parameters are simultaneously off their nominal values by the expected maximum tolerances.

CONTENTS: Basic Building Blocks in Digital Computers . . . Logical Chains in Digital Computers . . . Transistor Fundamentals . . . Transistor Transient Response . . . Diode Gating . . . Voltage-Switching Diode Gate Logic with Transistor Inverting Amplifiers . . . Current-Switching Diode Gate Logic with Transistor Inverting Amplifiers . . . Resistance Logic with Transistor Inverting Amplifiers . . . Direct-Coupled Transistor Logic . . . Miscellaneous Transistorized Logic Circuits . . . Design of Flip-Flops and Delay Multivibrators . . . Appendix: Measurement of Transistor Turn-On, Turn-Off, and Storage Times. #215, cloth, $9.95.

MATHEMATICS FOR ENGINEERS *by W. N. Rose, B.Sc. Eng. (Lond.)*

Head of Mathematics Department, Borough Polytechnic Institute

"We know of no mathematical engineering textbook so wide in scope as this, so exhaustive in treatment, and so valuable as a work of reference. ...Mr. Rose's work should appeal to all engineers."
—*The Scottish Educational Journal*

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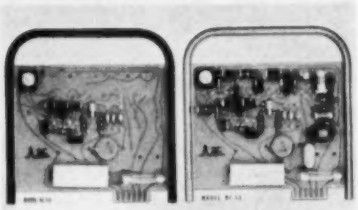
New Products of the Month

OSCILLATOR AND SLAVE CLOCKS [*Computer Control Co., Inc.*]

eem File System Sec. 2000



Additions To Line Of 1 MC Digital Modules

Oscillator Clock Model OC-10 and Slave Clock Model SC-10, have been added by this manufacturer to his T-PAC series of dynamic, 1 mc, digital modules. Both are for use in the recently announced T-BLOC (Model BL-11) which has slots for 32 T-PAC's plus space for an oscillator or slave clock module.

The oscillator clock has a crystal controlled oscillator which provides 1 mc clock pulses to one T-BLOC (BL-11) and synchronizing drive to up to 14 Slave Clocks Model SC-10. Power requirements are: −16 volts dc, ±10%, 25 ma; frequency, 1 mc, ±0.02% (unloaded or 14 BLOC load).

The slave clock is identical to the oscillator clock, but without the crystal controlled oscillator. It incorporates a fuse in series with the −16 volt supply to protect the T-BLOC. Bypass capacitors are also included in the circuits to filter high-frequency currents. Power requirements are: −16 volts dc, ±10%, 6 ma.

PRICE: Model OC-10: $138.00; Model SC-10: $71.00
AVAILABILITY: 30 days
MFR: Computer Control Co., Inc., 983 Concord Street, Dept EP, Framingham, Mass.
SALES OFFICES: See **eem** p. 1556 (1960-61 Ed.)
OTHER PRODUCTS: See **eem** p. 667

Check 45 Reader Service Card 6/60

SLIDE PLATE READOUT [*Industrial Electronic Engineers, Inc.*]

Eliminates Need For Decoding Device—Operates From Binary Input

This new, revolutionary readout display operates directly from a binary input. It eliminates the need for a decoding device to translate binary information into decimal information. The unit automatically decodes any BCD code up to six bits into numeric, alphabetic, or special symbol character presentation.

The slide plate readout is designed for use with digital computers, control equipment, instruments, and other electronic or electrical test equipment. In addition, it will work directly from teletype machines.

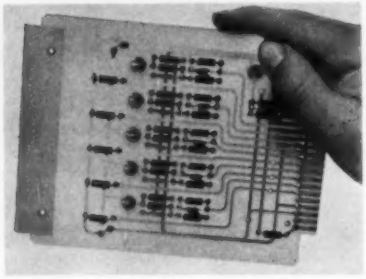
The readout provides 16 digits or special characters and operates on a light-interference principle. Each of the 16 character plates in the unit contains small holes which form a digit or character. Light from the single lamp in the rear of the unit passes through these holes to form a figure on the front viewing screen.

The readout will display a character until commanded to accept or display a new character. Only 10 mw of signal power is required. Check-back and verification circuits are also provided.

PRICE: $40.00; **AVAILABILITY:** 30 days
MFR: Industrial Electronic Engineers, Inc., 5528 Vineland Avenue, Dept EP, North Hollywood, California
SALES OFFICES: See **eem** p. 1613 (1960-61 Ed.)
OTHER PRODUCTS: See **eem** p. 677

Check 46 Reader Service Card 6/60

TRANSISTORIZED DIGITAL SYSTEMS MODULES [*Navigation Computer Corporation*]



Provide NOR, OR, NAND, AND Functions

Affording all possible gating functions with a high fan-out capability and sufficient amplification to drive twenty additional gates, these new modules are manufactured as standard 5" by 6" glass epoxy printed circuit cards, with an 18 pin printed circuit receptacle. Each module has four individual sections per card. There are eleven inputs available at the printed circuit tab, and any input can be directed to any of the four gates.

Model 346A provides the NOR function; it contains a diode OR gate followed by an inverting amplifier and an emitter follower.

Model 346B provides the OR function; it contains a diode OR gate followed by two emitter followers.

Model 346C provides the NAND function; it contains a diode AND gate followed by an emitter follower and an inverting amplifier.

Model 346D provides the AND function; it contains a diode AND gate followed by two inverting amplifiers.

PRICE: $99.00; **AVAILABILITY:** 4 weeks
MFR: Navigation Computer Corp., 1621 Snyder Avenue, Dept EP, Philadelphia, Pa.
SALES OFFICES: See **eem** p. 1647 (1960-61 Ed.)
OTHER PRODUCTS: See **eem** p. 679

Check 47 Reader Service Card 6/60

Additional New COMPUTER PRODUCTS

Digital Electronic Timer designed for use in computer systems needing precise elapsed timing intervals. Model DET-420 has maximum error of 100 μsecs in addition to any times base error. Intervals such as 5, 25, and 20 seconds can be set into timer. There are no relays in the timer. **PRICE:** $5,000.00 (quantity discounts); **AVAILABILITY:** 8 weeks; **MFR:** Bulova R & D Labs, Inc., 62-10 Woodside Ave., Woodside 77, N. Y.; **SALES OFFICES:** See **eem** p. 1543

Check 158 Reader Service Card

Analog Integrator Networks, operational amplifier, feature high level of accuracy and stability over wide temperature ranges. Consisting of from 1 to 18 input branches and a feedback (integrating) capacitor in an oil-filled hermetically sealed can. Both the initial RC product and the drift coefficients of the RC product are individually, independently trimmed during manufacture, without use of variable resistors or trimming controls. **PRICE & AVAILABILITY:** Vary with requirements; **MFR:** Julie Research Laboratories, Inc., 556 W. 168 St., New York 32, N. Y.; **SALES OFFICES:** See **eem** p. 1619.

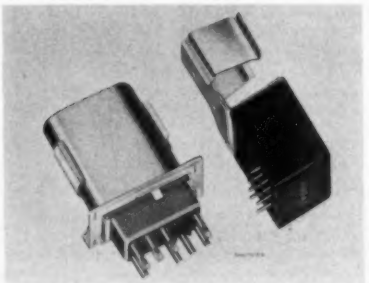
Check 159 Reader Service Card

Miniature Printer provides printing speeds of more than 30 characters/sec on ⅜" tape. 9¼" long, with self contained paper supply, unit fits standard 3" instrument case. Applications include printer for computer output, weapons systems checkout devices, reduction of size of present office teletype equipment. **PRICE:** Under $500.00; **AVAILABILITY:** Depends on Specs; **MFR:** Potter Inst. Co., Plainview, N. Y.; **SALES OFFICES:** See **eem** p. 1663

Check 160 Reader Service Card

MICRO-MINIATURE RELAY SOCKET ASSEMBLIES [*Augat Bros. Inc.*]

eem File System Sec. 2100



Feature Solder Cup Or P.C. Pin Screw Machine Contacts

Specifically designed for use with various types of micro-miniature relays, conforming to MIL-R-5757, MIL-R-6106 and MIL-R-25018 is this new line of high quality Micro-Miniature Relay Socket Assemblies. The units feature solder cup or printed circuit pin screw machine contacts.

The unit (see photo) is available with holding clips of beryllium copper alloy 25 (per QQ-C-533), or annealed carbon steel SAE 1065 (per MIL-S-17919-Navy-No. 4) cadmium plated per MIL Spec QQ-P-416A, Class 2, Type 11, golden iridite, and socket insulation of Diallyl Phthalate insulation (per MIL-M-14, Type MDG) or Melamine (per MIL-M-14, type MME).

These units are available in a variety of mounting styles with 8 or 10 contacts. The mounting styles offered are horizontal, horizontal printed circuit, vertical, vertical printed circuit and socket only.

PRICE: $1.25 to $1.50; **AVAILABILITY:** 2 to 3 weeks
MFR: Augat Bros. Inc., 33 Perry Ave., Dept EP, Attleboro, Mass.
SALES OFFICES: See **eem** p. 1530 (1960-61 Ed.)
OTHER PRODUCTS: See **eem** p. 817

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GENERAL INSTRUMENT

SUBMINIATURE

silicon power diode/rectifiers

PIV up to 600 V.

high conductivity

150 ma @ 150° C.

low leakage

designed to meet USAF MIL-E-1/1143 specs

These fine silicon diode/rectifiers meet and exceed the USAF specs . . . and retain their outstanding characteristics and reliability at temperatures of 150° C. and more. **General Instrument also has available a new series of subminiature diode/rectifiers to operate at 200° C.!** Complete technical information is available upon request.

JEDEC TYPE NO.	MAXIMUM RATINGS			ELECTRICAL CHARACTERISTICS			
	PEAK INV. VOLTAGE (V)	MAX. AVG. RECTIFIED CURRENT (mA)* @ 25° C.	MAX. AVG. RECTIFIED CURRENT (mA)* @ 150° C.	MINIMUM SATURATION VOLTAGE @ 160° C. (VOLTS)	MAXIMUM REVERSE CURRENT @ PIV (uA) @ 25° C.	MAXIMUM REVERSE CURRENT @ PIV (uA) @ 100° C.	MAXIMUM VOLTAGE DROP @ 400 ma DC @ 25° C. VOLTS DC
1N645	225	400	150	275	0.2	15	1.0
1N646	300	400	150	360	0.2	15	1.0
1N647	400	400	150	480	0.2	20	1.0
1N648	500	400	150	600	0.2	20	1.0
1N649	600	400	150	720	0.2	25	1.0

*Resistive or inductive load

For immediate delivery of General Instrument semiconductors at factory prices call your authorized stocking distributor:

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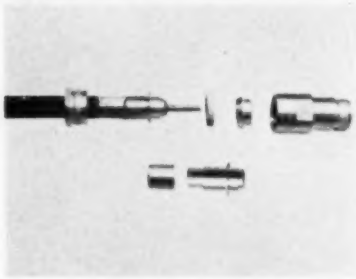
New Products of the Month

GRIP RF CONNECTORS [*Kings Electronics Company, Inc.*]

eem File System Sec. 2100



Attaches RF Connectors To Coaxial Cable Easily

This new Grip, designated as K-GRIP®, offers a new and revolutionary method for attaching RF connectors to coaxial cable, the maker says.

The grips are available for use with RG-8/U and RG-58/U cables. The parts of the connectors can be readily removed for inspection or replacement in the field without disturbing or impairing the electrical characteristics of the cable assembly.

It is claimed that use of the grip eliminates the need of highly skilled personnel to attach the connector to the cable. Assembly is accomplished by means of a readily available inexpensive Thomas & Betts tool. In addition, soldering may be eliminated on connectors which have brass center contacts because the center contact may be crimped to the cable's center conductor by the same tool.

The manufacturer says the K-GRIP does not obsolete present inventories of connectors. The grip for Type RG-8/U cable can be used with over 50 standard RF connectors.

PRICE: Contact Sales Offices below
AVAILABILITY: From stock
MFR: Kings Electronics Co., Inc., 40 Marbledale Rd., Dept EP, Tuckahoe, Westchester County, N. Y.
SALES OFFICES: See **eem** p. 1622 (1960-61 Ed.)
OTHER PRODUCTS: See **eem** p. 698

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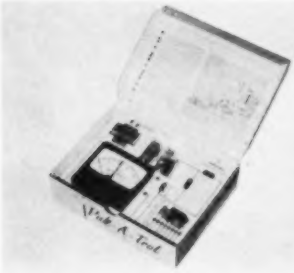
CONTROL KIT [*Assembly Products, Inc.*]

eem File System Sec. 2200



Adds Control Or Signaling Functions To Any Process, Product, Operation

No specialized ability is needed to assemble this new control kit which is designed for self-assembly of a simple control that will adapt to almost every electrically measurable variable.

The heart of this kit is a continuous reading meter-relay that permits simplified circuitry and instantaneous reset without the use of either interrupters or electronic circuitry. The kit is designed for flexible installation in relatively uncomplicated control applications where only a direct unamplified signal is available. Included in the kit, with the meter-relay, are all the parts needed for putting together a complete control: transformer, load relay, capacitor, resistors, rectifiers and terminal block.

The 4" meter-relay is available in the following ranges: 0-1 ma dc; 0-100 ma dc; 0-47 ma ac (with scale reading 0-150%) for use with transformer to read virtually any a-c signal; 0-500°F; 0-1500°F; 0-2500°F; 0-50 mv dc, and 0-10 mv dc.

Control action of the meter-relay is directly linked to the signal by indicating and adjustable pointers.

PRICE: $97.50; **AVAILABILITY:** Stock to 2 weeks
MFR: Assembly Products, Inc., Dept EP, Chesterland, Ohio
SALES OFFICES: See **eem** p. 1528 (1960-61 Ed.)
OTHER PRODUCTS: See **eem** p. 840

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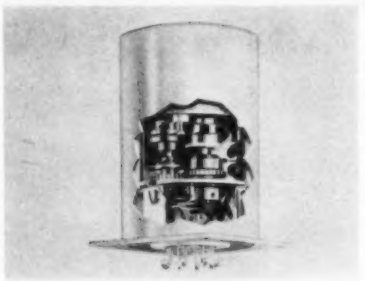
HERMETICALLY SEALED TIME DELAY TIMER [*Industrial Timer Corp.*]



Automatic Reset—Dependable Service Under Extreme Ambient Conditions

Added to this manufacturer's line is a new Series "D" Hermetically Sealed Automatic Reset Time Delay Timer. The unit is specifically designed for applications requiring extreme accuracy and dependable service under extreme ambient conditions.

The device has been tested and qualified under the following military specifications: MIL-T-4807 shock and vibrations methods 1A, 3A, and 5A; MIL-E-5272B humidity, salt spray, high and low temperature, barometric pressure, and life test. The device also conforms to MIL Spec. #R-5757.

Time cycles from 1 second to 60 hours are available. Switches are SPDT snap action rated at 5 amps. 115/60 non inductive. Units are available with additional load switches. Individual switches are timed according to customer specifications.

Voltages are 6 to 230 volts, 25, 50, 60 or 400 cycles; 6, 12, 24, 28 or 115 VDC. Chronometrically governed d-c motors are available for applications requiring extreme accuracy using dc.

PRICE: Model 115/60 $53.50 each (subject to standard quantity discount); **AVAILABILITY** 8 to 10 weeks
MFR: Industrial Timer Corp., 1407 McCarter Highway, Dept EP, Newark 4, N. J.
SALES OFFICES: See **eem** p. 1614 (1960-61 Ed.)
OTHER PRODUCTS: See **eem** p. 720

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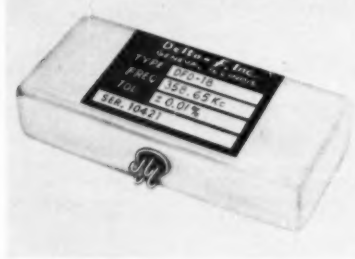
TRANSISTORIZED CRYSTAL OSCILLATOR [*Delta-F, Inc.*]

eem File System Sec. 2300



Designed For Military Aircraft Computer Application

Originally designed for a military aircraft computer application, the Model DFO-18 Transistorized Crystal Oscillator is now available for commercial use at any specified frequency in the range of 10 kc to 100 mc.

A completely encapsulated circuit, the package size is only ½" high, 1 1/16" wide and 3 1/16" long. The Model DFO-18 is available in the 4 pin solder type connector positioned as illustrated or any other type or position compatible with the unit size.

The operating temperature range is −55°C to 90°C with a frequency stability of 0.005% to 0.015%, depending on the specified frequency. Output power is 0.1 mw minimum. Load impedance is 50 ohms to 600 ohms, and 5000 ohms below 1 mc. Oscillator current drain is 3 ma from 100 kc to 100 mc, and 5 ma from 10 kc to 99 kc.

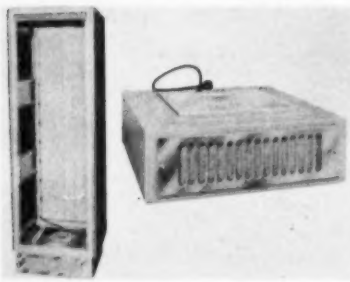
The supply voltage is as specified, 20 to 30 volts. The unit is mounted by tapped holes, a flange, a strap or studs, as specified.

PRICE: $144.00 to $182.00
AVAILABILITY: 30-45 days
MFR: Delta-F, Inc., 113 East State Street, Dept EP, Geneva, Illinois
SALES OFFICES: See **eem** p. 1564 (1960-61 Ed.)
OTHER PRODUCTS: See **eem** p. 733

Check 52 Reader Service Card 6/60

PONTOON BASE BLOWERS [*McLean Engineering Laboratories*]

eem File System Sec. 2600



For Installation Under Standard Cabinets—Supports 2000 Pound Load

Designed for installation under the standard modular electronic cabinet, this new cooling device permits the total utilization of electronic rack space for instruments and components, and at the same time, provides a high level of forced-air cooling for the entire rack.

The recessed toe space, or pontoon base, is removed and replaced with this new Pontoon Base Blower—which will support 2000 pounds. Two basic models are being manufactured: one with a 500 cfm output, and the other with a 250 cfm output. Either model may be equipped with heavy-duty dual wheel casters, with a manufacturer's rated load of 200 pounds per dual wheel. The motors are heavy duty, permanent, split-capacitor type with ball bearings, and a stainless steel shaft. They are permanently lubricated with Lubricant per MIL-G-3278, fungus protected, and moisture and corrosion resistant. Single phase, 115 volt, 60 cps equipment is supplied as standard. The motors meet the requirements of military specification CC-M-636A.

PRICE: $165.00 to $197.50; **AVAILABILITY:** 6 weeks
MFR: McLean Engineering Labs, P.O. Box 228, Dept EP, Princeton, New Jersey
SALES OFFICES: See **eem** p. 1634 (1960-61 Ed.)
OTHER PRODUCTS: See **eem** p. 783

Check 53 Reader Service Card 6/60

Have you a unique problem in electronic design, engineering or procurement? Send it to the Editor of ELECTRONIC PRODUCTS Magazine. Some of our more than 56,000 readers will undoubtedly have a solution.
Here are some typical problems recently received, as well as solutions to problems previously published.

FREE TECHNICAL BOOKS AWARDED FOR OUTSTANDING PROBLEMS & SOLUTIONS

Each month two books will be awarded to ELECTRONIC PRODUCTS Magazine readers—one for the most pertinent problem, the other for the best solution to any problem. The winners, chosen by the Editor, may select their awards from the current catalog of John F. Rider Publisher, Inc. All decisions final; duplicate prizes in case of ties.

(Problem 152)

INDEXING TYPE SOCKETS

We are looking for a source of supply for the following sockets: 1) Double contact, bayonet indexing type with mounting bracket; 2) Double contact prefocused with mounting flange.

(Problem 153)

RELAY WITH SILICON RECTIFIER

We are interested in obtaining a relay with rectifier having the following characteristics: 1) Power source—18 to 20 V 60 cps, single phase; 2) Full wave (silicon) rectifier; 3) Relay contacts to close 25 ±10 milliseconds after application of power; 4) Relay contacts normally open; 5) Relay contacts inrush current approximately 15 amps. normal duration 10 milliseconds; 6) Relay coil energized continuously or, at rate of 15 times per minute for 50 milliseconds, or a combination of both; 7) Rectified current thru relay coil to primer must not exceed .05 amps; 8) Relay and rectifier must each be replaceable; 9) 30G shock resistance; 10) Vibration resistance—10G @ 5 to 500 cps; 11) Operating temperature –65°C to 125°C; 12) Mounting—drilled holes.

(Problem 154)

MONITOR-CONTROLLER "BLACK BOX"

I am hereby submitting specifications for a device which we need. This device could be a "black box" which should:

Continuously monitor an input d-c voltage which might have any value from zero to, say, 100 volts. Upon "request", make a contact closure of a duration proportional (within ±2%) to the voltage; maximum duration about 2 seconds. Closure periods below roughly 0.1 seconds would not be required and should not be made. Open and stay open thereafter, come what may, until again signalled for a closure. (This is an important "fail-safe" requirement). The requesting signal could be external contact closure, the application of an a-c or d-c voltage, or whatever operation might best suit the maker's needs. Cost and required space would be factors of consequence, other specifications are quite flexible.

(Problem 155)

AUTOMATIC CASTINGS COUNTER

Our problem is to count automatically aluminum castings while on a conveyor without touching the castings, and in addition to distinguish between different size castings of the same general shape.

We have already tried electric eye units, but these are subject to failure or error due to changing conditions, and they will not distinguish size.

(No reasonable solutions having as yet been received to the problems below we are running them again. Do any of our readers have solutions to offer? Ed.)

(Problem 141)

PRECISION RESISTIVE POTENTIOMETERS

Our problem is to control procurement of precision resistive potentiometers by specification such that upon integration into a predetermined environment a predictable noise level can be obtained along with an optimum noise level life. To be more specific, in a pot exactly meeting the 100 ohm at 1 ma of wiper current requirement of NAS710, is it possible to predict the order and direction of wiper noise change at 1 microampere of wiper current and currents in between? What wiper currents are conductive to optimum noise life? Do answers to the above questions vary widely with regard to wound pots, plastic pots and film pots?

(Problem 145)

TRANSISTORIZED PULSE GENERATOR

A small transistorized module is required as a Standard Pulse Generator so as to standardize various timing pulses. The input impedance should be at least 5K ohms and the generator should trigger on a pulse amplitude of 5 volts negative or positive. The output should be a choice of a positive or negative pulse of 40 volts amplitude into 90 ohms. Pulse rise and fall times of 0.2 microsecond and pulse duration of approximately 1.0 microsecond are desired at repetition rates of 10KC/sec. The unit should operate over the temperature range of 20°C to 40°C and any passive load, including a short circuit, when connected to the output should not cause failure of any component in the generator.

SOLUTIONS TO PROBLEMS IN PREVIOUS ISSUES

(Problem 139)

TRANSISTORIZED ADUSTABLE CYCLER

We would like to obtain a transistorized adjustable cycler. The output of the cycler to drive a 6 watt coil of a mercury relay. Both On and Off times are to be adjustable from ¼ to 180 seconds.

SOLUTION D: Here is a possible solution to this problem. I have used this circuit with a high degree of success.

OPERATION: Timing of the circuit is accomplished through the use of Unijunction Transistors and Capacitor Resistor Networks. Unlike vacuum tube circuitry, this circuit exhibits very high stability and timing accuracy and is affected very little by temperature changes. The highest quality components should be used throughout its fabrication. With the components shown approximately 1 second per 10 K ohms of R1 can be expected.

(Continued on page 13)

TECHNICAL BOOK AWARDS FOR MAY

Solution to Problem 139: S. J. Gewirtz, Ch. Eng. Marstan Electronics Corp., Roosevelt, L. I., N. Y.

Problem 150: C. R. Kemp, Proj. Eng. Garrett Oil Tools, Div. U. S. Industries, Inc., Longview, Texas.

JERROLD

R. F. Test Equipment

Quantitative Measurements Using Sweep Frequency Techniques

Model 900A—THE MOST VERSATILE SWEEP GENERATOR $1,260.00

CENTER FREQUENCY—VHF 0.5 to 400 MC UHF 275 to 1000 MCS—SWEEP WIDTH—up to 400 MCS—FLATNESS—±0.5 db over widest sweep!

Model 707—ULTRA FLAT SWEEP GENERATOR $795.00

Featuring ±5/100 db *flatness*—Plug-in osc. heads*; variable sweep rates from 1/min. to 60/sec.; all electronic sweep fundamental frequencies; sweep width min. of 1% to 120% of C.F.

*Heads available within the spectrum 2 to 265 MCS

Models 601/602—PORTABLE GENERAL PURPOSE $295.00

COVERAGE—Model 601—12 to 220 MCS. Model 602—4 to 112 MCS—FLATNESS — ±0.5 db OUTPUT—up to 2.5 V RMS WIDTH-1% to 120% of C.F.

Model FD-30 $250.00

High speed DPDT coaxial switch permitting oscilloscope measurements without calibration—all measurements referenced continuously against standard attenuators.

Model AV-50 Variable Precision Attenuator $150.00

Long life rotary switches; dual wiping silver contacts on "Kel-F" dielectric. 0-62.5 db in ½ db steps; DC to 500 MCS.

Write for catalog and technical Newsletter series on measurements using sweep frequency techniques. Prices and data subject to change without notice.

JERROLD **ELECTRONICS CORPORATION**
Industrial Products Division Dept. ITE-19
The Jerrold Building, Philadelphia 32, Pa.
Jerrold Electronics (Canada) Ltd., Toronto
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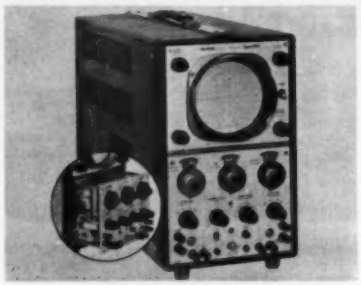
eem File System Sec. 2900
electronic engineers master

NULL-READOUT OSCILLOSCOPE [*Analab Instrument Corporation*]



Utilizes Null-Balance Technique—Incorporates Anti-Parallax Scale

Type 1100/700 Oscilloscope is of special modular design. The Type 1100 Main Frame is a basic, self-operable cathode-ray tube indicator which serves as the fundamental building block for this manufacturer's complete system of oscilloscopes. The Type 700 is a dual-channel plug-in. There are 64 contacts available for the transfer of signals and voltages between the Type 1100 Main Frame and the plug-in.

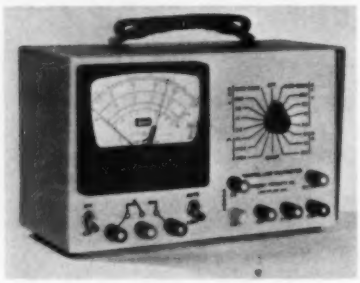
To avoid the usual reading errors from the cathode ray tube screen, the unit incorporates an anti-parallax scale, equivalent to a mirror-backed scale on a meter. With the Type 700 Dual-Channel Plug-In, incorporating 1% null-readout potentiometers for measuring amplitude on the two signal channels as well as sweep time, the null readout system is the fastest method for making direct, repeatable, accurate measurements without interpolation, it is claimed.

A beam finder automatically locates off-screen traces and gives "notch positioning" and location on expanded sweeps. The Type 1100 is available in rack-mounted form, 7" high by 19" wide and accommodates 7" high plug-ins.

PRICE: Type 1100: $385.00; Type 700: $310.00
AVAILABILITY: 30 days
MFR: Analab Instrument Corporation, 30 Canfield Road; Dept EP, Cedar Grove, New Jersey
SALES OFFICES: See **eem** p. 1525 (1960-61 Ed.)

Check 54 Reader Service Card 6/60

CONTROLLING MULTIMETER [*Assembly Products, Inc.*]



Guards Virtually Any Critical Voltage, Current, Or Resistance

Measuring only 11" by 6" by 6", and believed to be the first unit of its kind, the new instrument is a combination of a conventional multimeter and a continuous reading meter-relay with adjustable set points. It is designed for use in both laboratories and industrial processes.

Ranges of the multimeter are as follows: a-c and d-c voltage, 2.5,10,50,250, and 1000-5000; current, 0-100 μa; 0-10 ma, 0-100 ma, and 0-10 amperes; resistance, to 20 megohms in three scales with center scale values of 12, 1200, and 120,000 ohms.

Regardless of what value is being monitored, the continuous reading meter-relay permits control action to be linked directly to the signal. As in standard locking contact meter-relays, an adjustable pointer sets the signal limit. When the indicating pointer reaches the set point, it trips a toggle contact on the adjustable pointer. A control relay is either energized or released, depending on whether the signal is rising or falling. A three position switch sets up the instrument for flexible action.

PRICE: $230.00; **AVAILABILITY:** 6-8 weeks
MFR: Assembly Products, Inc., 75 Wilson Mills Road, Dept EP, Chesterland, Ohio
SALES OFFICES: See **eem** p. 1528 (1960-61 Ed.)
OTHER PRODUCTS: See **eem** p. 840

Check 55 Reader Service Card 6/60

ARC RESISTANCE TESTER [*Associated Research Inc.*]

Provides 15 KV at 60 Ma AC—Tests Solid Insulating Material

The new high voltage (15KV, 60MA AC) Arc Resistance Tester was designed specifically to ASTM Spec. D-495 and Federal Spec. LP406B, for testing the ability of solid electrical insulating materials, to resist the action of an arc close to the surface of the insulation. It is a bench type instrument complete with test electrode assembly, specimen holder and transparent safety cage. An electrode sharpening jig is also supplied.

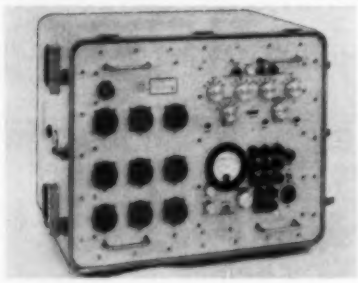
The unit is equipped with internal blower for cooling and venting away toxic gases from the test specimen; continuously variable voltage control to preset the necessary open circuit voltage at the electrodes and to compensate for line voltage fluctuations.

Other features include 7 arc control switches to control the cycling and severity of the arc, an interval timer with manual reset for timing the total time of test application to the nearest 1/10 second, a suppressed zero voltmeter to accurately meter primary voltage between the range of 90 and 130 volts and a safety interlock switch on the transparent draft shield.

PRICE: $2,250.00; **AVAILABILITY:** 10 to 12 weeks
MFR: Associated Research Inc., 3777 W. Belmont Ave., Dept EP, Chicago 18, Ill.
SALES OFFICES: See **eem** p. 1528 (1960-61 Ed.)
OTHER PRODUCTS: See **eem** p. 842

Check 56 Reader Service Card 6/60

MILITARIZED CABLE HARNESS ANALYZER [*California Technical Industries*]



For High-Potting Simple And Complex Branch Circuits

This new Militarized Cable Harness Analyzer, Model 196, allows simple and complex branch circuits to be high-potted and measured for leakage to all other circuits. Simultaneously with the leakage test, continuity (conductor resistance) is measured. In automatic operation the wires under test are checked at a maximum rate of 5 wires/second. When a fault occurs the tester stops and indicates the circuit and type of fault.

The unit will check 150 simple circuits, 75 main circuits with any combination or number of branch circuits to a total of 75 branches, or any intermediate combination of main and branches up to a total of 150.

Measurements are made on precision bridges which combine accuracy with fail-safe operation. Continuity testing can be made from 0.3 to 10.0 ohms at 0.5 to 3 amps. and high-pot tests can be made up to 1,000 VDC. For high-potting, a continuously variable control gives dwell times from 0.2 to 10 seconds. A built-in ohmmeter for manual checking measures leakage resistance from 0 to 1,000 megohms. Meets requirements of MIL-T-945A.

PRICE: $7,000.00; **AVAILABILITY:** 60 days or less
MFR: Calif. Technical Ind., Div. of Textron Inc., 1421 Old County Rd., Dept EP, Belmont, Calif.
SALES OFFICES: See **eem** p. 1546 (1960-61 Ed.)

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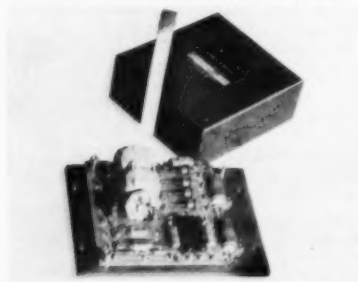
LINEAR MAGNETIC AMPLIFIER [*Control, Division of Magnetics, Inc.*]



For Instrumentation Work Involving Low Level Signal Sources

Instrumentation Amplifier, Model 4511, is ideal for driving d-c meters and mechanical recording instruments because its d-c output is a pulse width modulated series of pulses with a basic 6 kc repetition rate. No filtering of the unit's output is required for operation of the meters and recorders. Typical low level transducers with which this device is compatible include photocells, strain gauges, thermistors, shunts, and thermocouples.

The Model 4511, a single package unit, actually consists of two parts: 1) a double-ended center tap magnetic amplifier which is excited at 3 kc by 2) a d-c to a-c static converter. It is the simultaneous operation of the amplifier and converter that makes the unit unique.

By using the d-c to a-c converter as a 3 kc excitation source for the basic amplifier, optimum performance and economical construction were able to be designed into the unit.

Rated load on the unit is 2000 ohms. Operating temperature is 0°F to 120°F. Its dimensions are: 4½" wide by 6" long by 2" high. Supply power drain is 3.6 watts nominal.

PRICE: $160.00 (list); Industrial discounts apply
AVAILABILITY: From stock
MFR: Control, Division of Magnetics, Inc., Dept EP, Butler, Pa.
SALES OFFICES: See **eem** p. 1558 (1960-61 Ed.))

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Problems & Solutions

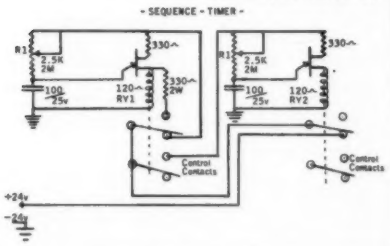
(Continued from page 11)

a. Transistor #1 is a circuit used to obtain a precise delay of .25 seconds to 200 seconds before relay #1 is energized.

b. When relay #1 is energized (after the desired set time delay) it locks up through its holding contacts and supplies power to Transistor #2 which is set for a delay of .25 seconds to 200 seconds. At the end of #2 delay, relay #2 energizes. This relay does not utilize a lock up contact. When it was energized it broke power to relay #1 and itself, starting circuit #1 again. The relay chosen is a DPDT, enabling various control configurations to be used.

c. The type relay used in this unit was an Elgin MV/2C/120D at a cost of $13.85. Type 2N494 General Electric Unijunction Transistors were used at a cost of approximately $16.00 each. In order to insure reliability, top grade tantalum capacitors were used with Bourns high temperature model 260 Trimpots in conjunction with the appropriate series resistor to obtain the time delay desired.

C. A. Blais, Engineer
Philco, Rome, N. Y.



(Problem 144)

MOTOR ARMATURE TEMPERATURE RISE

The temperature rise of a motor armature at the time of power cut-off is desired. The measurements must start within one minute from the time the motor stops. It is desired to obtain this parameter by extrapolation of a plot of armature resistance versus time.

Would it be possible to obtain these armature resistance measurements by an automatic process such as a digital printout? The temperature rise is approximately 500°F with an armature resistance of .003 ohm at 68°F.

SOLUTION A: Congratulations for an excellent method of promoting communications between electronic manufacturers and their customers through your "Electronic Problems and Solutions"!

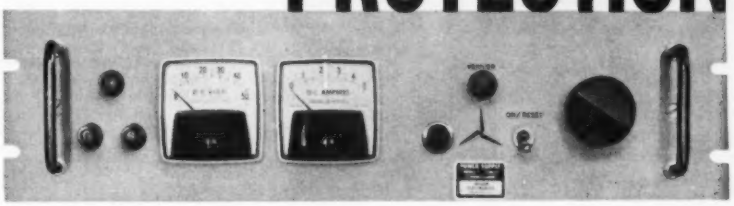
We would like to offer this solution to problem 144. The measurement would be made by attaching a constant-current signal generator to the windings, amplifying the voltage output, and attaching this d-c level to an extremely accurate voltage-to-frequency converter. This frequency can be counted and translated from this converter directly into temperature units on one of Dymec's counters, and recorded on printed paper tape. This information could, at a later time, be transferred to a graphical display.

D. M. Scribner, Sales Eng.
Dymec Div. Hewlett-Packard,
Palo Alto, Calif.

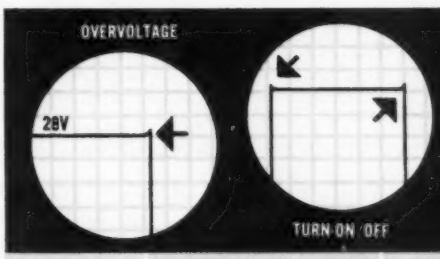
(Continued on page 19)

TRANSISTORIZED DC POWER FOR FAIL/SAFE OPERATION

Exclusive
AUTOMATIC
OVERVOLTAGE
PROTECTION



Prevents damage to power supply load under any conditions. Unique electronic circuitry monitors output voltage at all times and reduces output voltage and current to nominal zero if output attempts to rise above operating voltage. Of course turn-on and turn-off transients are also eliminated.



OVERVOLTAGE PROTECTION: Voltage excursion above operating voltage in case of internal fault condition is less than 5% or 1½ volts for less than 5 milliseconds.

TURN-ON OFF TRANSIENT ELIMINATION: Transient less than 1% or ½ volt for less than 5 milliseconds.

MODEL	DC OUTPUT VOLTS	DC OUTPUT AMPS	PANEL HEIGHT (in inches)	REGULATION LOAD	REGULATION LINE	RIPPLE RMS (max.)
S36-2.5	0-36	0-2.5	3½			
S36-5	0-36	0-5	5¼			
S36-10	0-36	0-10	7			
S36-15	0-36	0-15	7	0.01%	0.01%	1 mv
S60-2.5	0-60	0-2.5	5¼			
S60-5	0-60	0-5	7			
S60-10	0-60	0-10	10½			
S72-15	0-72	0-15	14			
S300-200	110-325	0-0.2	3½			
S300-400	110-325	0-0.4	3½	0.02%	0.02%	3 mv
S300-800	110-325	0-0.8	3½			
S300-1500	110-325	0-1.5	5¼			
T36-600	0-36	0-0.6	Bench Supply	0.05%	0.05%	1 mv
T18-1	0-18	0-1				

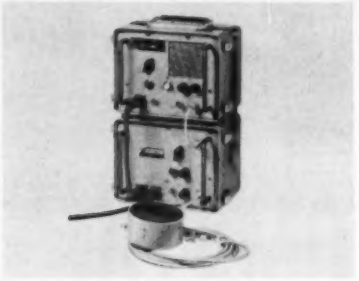
All units available with remote programming

TRYGON ELECTRONICS, INC.
111 Pleasant Ave. Roosevelt, L. I., N. Y.
FRseport 8-2800

Check 8 Reader Service Card

HARMONIC MULTIPLIER ADAPTER [*Control Electronics Company, Inc.*]

eem File System | Sec. 2900 electronic engineers master



Provides High Amplitude Frequency Marker From 1,000 to 11,200 MCS

This concern has developed a new Harmonic Multiplier Adapter, Model 143, for their VHF-UHF Frequency Calibrator, Model 121. The adapter increases the power level of the calibrator's frequency marker signals in the frequency range from 1,000 to 11,200 megacycles.

The frequency calibrator, equal to the AN/USM-45, generates a series of simultaneous frequency marker signals spaced every 50 mc to 11,200 mc with a frequency accuracy of ±0.005%. The output level at 11,200 mc is greater than −70DBM. The level increases as the frequency decreases, thus providing a level of −10DBM at 200 megacycles.

The adapter acting as an amplifier-signal generator increases the power output level of the frequency marker signals to a level of −30DBM. The unit also alters the frequency spacing to 1600 mc at a level of −30DBM, and to 400 mc at a level of −50DBM.

The combination package was primarily designed for use as a quick, GO-NO-GO check on airborne microwave receivers.

PRICE: $980.00 (1 to 5); **AVAILABILITY:** From stock
MFR: Control Electronics Company, Inc., 10 Stepar Place, Dept EP, Huntington Station, L. I., N. Y.
SALES OFFICES: See **eem** p. 1558 (1960-61 Ed.)
OTHER PRODUCTS: See **eem** pp. 748, 749, 802, 1009

Check 59 Reader Service Card 6/60

PANEL INSTRUMENTS [*DeJur-Amsco Corporation, Electronics Div.*]

Modern Design, Expanded Scale—For Replacement & Original Equipment

The first in a series of new Panel Instruments for commercial applications, with accuracy of ±2% of full scale, has been added to this manufacturer's line. Designated as Model 25 these units are 2½" in diameter with an expanded scale plate providing greater readability and improved reliability.

The modern style, streamlined plastic case requires no more space than ordinary meters, maker says. Models are available as Microammeters, Milliammeters, Ammeters and Voltmeters in a variety of ranges. All A-C Models are rectifier type.

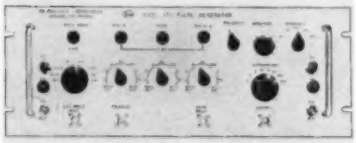
Featured also is a self-shielding internal core magnet with greater torque, eliminating the need for special calibrations when mounting on magnetic or non-magnetic panels. All models have an external zero adjuster. Various color trim is available on case and scale plate to match associated equipment.

Models of 1½" and 3½" diameters will be available soon.

PRICE: $9.95 to $6.25 (depending on quantity)
AVAILABILITY: Approx. July 1st
MFR: DeJur-Amsco Corporation, Electronics Div., 45-01 Northern Blvd., Dept EP, Long Island City 1, N. Y.
SALES OFFICES: See **eem** p. 1560 (1960-61 Ed.)
OTHER PRODUCTS: See **eem** p. 1269

Check 60 Reader Service Card

FAST PULSE GENERATOR [*E-H Research Laboratories, Inc.*]



For Fast Circuit Applications In The Computer Field

The Model 130 is a new Fast Pulse Generator featuring fast rise and low jitter.

The instrument has a repetition rate of 10 cps to 1 mc, a rise and fall time of less than 10 millimicroseconds, two pulse outputs with a relative pulse delay between them of 200 millimicroseconds to 50 milliseconds.

With its provisions for external drive and electronic gating, its great range in pulse widths and delays, and arbitrary cable impedance feature, the device fills a long standing need for a versatile pulser, the maker says.

This instrument is especially suited for fast circuit applications in the computer field, transistor testing and missle programs. Some specifications follow:

JITTER (pulse widths, relative delay, rep rate): 0.1%
TRIGGER OUTPUT: Positive 25 volt pulse
POLARITY: Positive or Negative available
OUTPUT IMPEDANCE: 50, 93, 125, 185, or 200 ohms available (selected by front panel switch)
DUTY FACTOR: 50 percent

PRICE: $1175.00; **AVAILABILITY:** 45 days
MFR: E-H Research Laboratories, Inc., 163 Adeline St., Dept EP, Oakland 20, Calif.
SALES OFFICES: See **eem** p. 1571 (1960-61 Ed.)

Check 61 Reader Service Card 6/60

TRANSISTORIZED TEMPERATURE COMPENSATED POWER METER [*FXR, Inc.*]

Measures CW Or Pulsed R-F Power 30 Microwatts To 3 Milliwatts

The Model B832T is a new compact, completely portable Transistorized Temperature Compensated Power Meter. The instrument can be hand-carried and operated wherever needed.

The unit will measure CW or pulsed R-F power in five full scale direct reading ranges from 30 microwatts to 3 milliwatts. The 3½" meter scale is calibrated in MW and DBM. Provision is made in the device to calibrate the D-C voltage at all levels and the bridge is self-balancing at 200 ohms. A self contained rechargeable nickel cadmium battery, with a use to charge ratio of 2 to 1, completely powers the instrument.

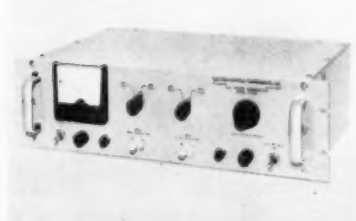
The instrument's unusual stability, even on the 30 microwatt range, is obtained by minimizing the effects which varying ambient temperatures have on the temperature sensitive elements used to measure R-F power. A Series 218 Temperature Compensated Thermistor Head is a required accessory.

Range can be extended to 1 watt or more by use of a Series 164 Direct Reading Precision Variable Attenuator.

PRICE: B832T $450.00
AVAILABILITY: From stock; Heads, 60-90 days
MFR: FXR, Inc., 26-12 Borough Place, Dept EP, Woodside 77, N. Y.
SALES OFFICES: See **eem** p. 1583 (1960-61 Ed.)
OTHER PRODUCTS: See **eem** pp. 1019-1022

Check 62 Reader Service Card 6/60

PULSE GENERATOR [*Electro-Optical Instruments, Inc.*]



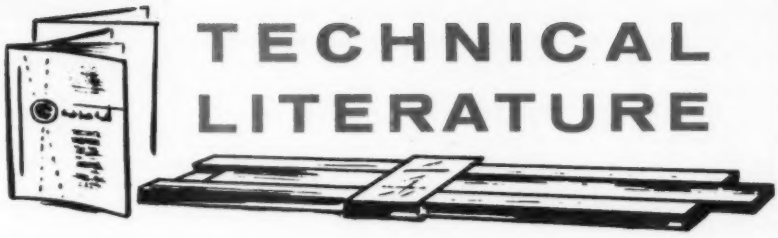
High Voltage — High Peak Power — Rectangular Waveforms

The Model TG-100 Pulse Generator is a new high voltage, high peak power, rectangular waveform pulse generator, designed for general use in experimental, developmental, and test applications. It is an integral unit, containing high voltage power supply and pulse generating circuitry. It is packaged in a compact instrument case suitable for bench use or rack mounting. Maximum usefulness, as well as convenience in operation, is achieved by simplified, reliable circuit design.

The pulse generator utilizes a hydrogen thyratron pulser which provides 20 nanoseconds (10^{-9}) rise and fall times. A unique pulse forming network is used which relies on an internal termination to provide a rectangular pulse shape regardless of whether or not the generator is terminated externally. The instrument is designed to operate into any resistive load while maintaining a rectangular wave shape output. Negative output is obtained directly from the thyratron, positive output by means of an inverting transformer. The unit operates at 60 cycle PRF internally synchronized or can be externally driven between 0 and 60 pulses per second. Power output is 0.5 megawatt, peak.

PRICE: $2200.; **AVAILABILITY:** 45 days or less
MFR: Electro-Optical Instruments, Inc., 2612 East Foothill Boulevard, Dept EP, Pasadena, Calif.

Check 63 Reader Service Card 6/60



TECHNICAL LITERATURE

OIL IMPREGNATED CAPACITORS — Sec. 1500

New bulletin containing complete physical and electrical characteristics of line of metal-cased, hermetically sealed d-c oil-impregnated capacitors Bulletin 121 Be.1 (Rev. 1). Contains data on new line of compact rectangular case units offering maximum capacitance in minimum sizes; also complete listings of available capacitance and voltage rating combinations. **Aerovox Corp.**, Dept EP, New Bedford, Mass.

Check 107 Reader Service Card

HIGH TEMPERATURE CAPACITORS — Sec. 1500

12-page Bulletin No. 1530 lists new cast stacked-foil Fabmika® high temperature capacitors suited for use to 125°C in airborne electronic equipment, pulse-forming networks, corrosive atmospheres, and in HV applications. **Sprague Electric Co.**, Dept EP, North Adams, Mass.

Check 108 Reader Service Card

SUBMINIATURE CP70 CAPACITORS — Sec. 1500

Bulletin on Deltaply 70 Capacitors describes these new subminiature rectangular CP70 style HV capacitors which utilize special techniques in laminating film plus paper to accomplish subminiaturization with higher volts per mil rating. Physical size and weight reduced by 75% to 80% over MIL-C-25 spec CP70 style capacitors. **Dearborn Electronic Laboratories, Inc.**, 1421 N. Wells St., Dept EP, Chicago 10, Ill.

Check 109 Reader Service Card

TANTALUM FOIL CAPACITORS — Sec. 1500

Bulletin 152F is a 4-page brochure, describes a new line of etched tantalum foil electrolytics as well as this maker's existing plain foil line. Extensive range of values in both etched and plain foil capacitors, as well as MIL values in plain foil types listed. **Ohmite Mfg. Co.** 3612 Howard St. Dept EP, Skokie, Ill.

Check 110 Reader Service Card

MICA BUTTON CAPACITORS — Sec. 1500

Bulletin TSC-100A presents a new group of high-temperature silvered mica button capacitors especially designed for continuous operation in the temperature range of −55°C to 230°C. They are rated at 200 VDCW in ratings from 50 to 4775 $\mu\mu$f, and have been developed for applications calling for low distributed inductance and reliable performance characteristics in high temperature environments. **Sangamo Electric Co.**, Dept EP, Springfield, Ill.

Check 111 Reader Service Card

EPOXY PELLETS — Sec. 1600

4-page Bulletin #3 discusses advantages of E-Form epoxy pellets for electronic components; variety of pellet compounds available; various epoxy packaging techniques, all illustrated by simplified diagrams. Typical applications and details on authentic case histories of packaging use, as well as summary of pellet formulations are included. **Epoxy Products**, 137 Coit St., Dept EP, Irvington, N. J.

Check 112 Reader Service Card

PROTECTIVE COATING — Sec. 1600

Data on a new protective coating, HumiSeal Type 1B15, a fast drying, one component system, applied by dip or brush, combining excellent electrical and moisture-proofing properties, is available from **Columbia Technical Corp.**, 61-02 31st Ave., Dept EP, Woodside, N. Y.

Check 113 Reader Service Card

PRINTED CIRCUIT ANALYSIS — Sec. 1700

Titled "Value Analysis of Printed Circuits", this 16-page booklet outlines the several functions that may be performed by printed wiring board, describes types of circuitry best adapted to this method, as well as those not too well suited for such use. Cost reducing suggestions are offered, as well as construction and design details. **Arthur Ansley Mfg. Co.**, Dept EP, New Hope, Pa.

Check 114 Reader Service Card

BUILDING BLOCKS, DIGITAL SYSTEMS — Sec. 2000

Short-Form Catalog (A-700) has quick reference table showing all 85 DEC building blocks and 22 accessory units. Arranged by type, patchcord interconnecting digital test equipment and plug-in system building blocks, as well as by speed, 500 kc, 5 mc and 10 mc. **Digital Equipment Corp.**, Dept EP, Maynard, Mass.

Check 115 Reader Service Card

THREADED COAX CONNECTORS — Sec. 2100

This 12-page technical bulletin on this maker's TNC Series of coaxial connectors provides complete data, and features a TNC function diagram graphically illustrating the types and flow of connectors by various cable sizes. Contains comprehensive presentation on calibrated reliability with graphs. **Kings Electronics Co. Inc.**, 38 Marbledale Road, Dept EP, Tuckahoe, N. Y.

Check 116 Reader Service Card

ROTARY SOLENOID BASICS — Sec. 2200

Leaflet 1 is a basic information sheet on rotary solenoids, graphically illustrating torque, speed of stroke, type of strokes, power take-off, and sizes. The units have high torque-to-size rotary motion and high thrust-to-size piston action for remote mechanical actuation or remote control of rotary type switches. **Ledex, Inc.**, 123 Webster St., Dept EP, Dayton 2, Ohio.

Check 117 Reader Service Card

ELECTRONIC TIMERS — Sec. 2200

A series of technical data sheets covers detailed engineering specs on the maker's time delay relays, describing special features, general description, typical applications. Data is in tabular form, includes voltage and temperature ranges, contact ratings, time delays, duty cycles, etc. **Voi-Shan Electronics**, 13259 Sherman Way, Dept EP, No. Hollywood, Calif.

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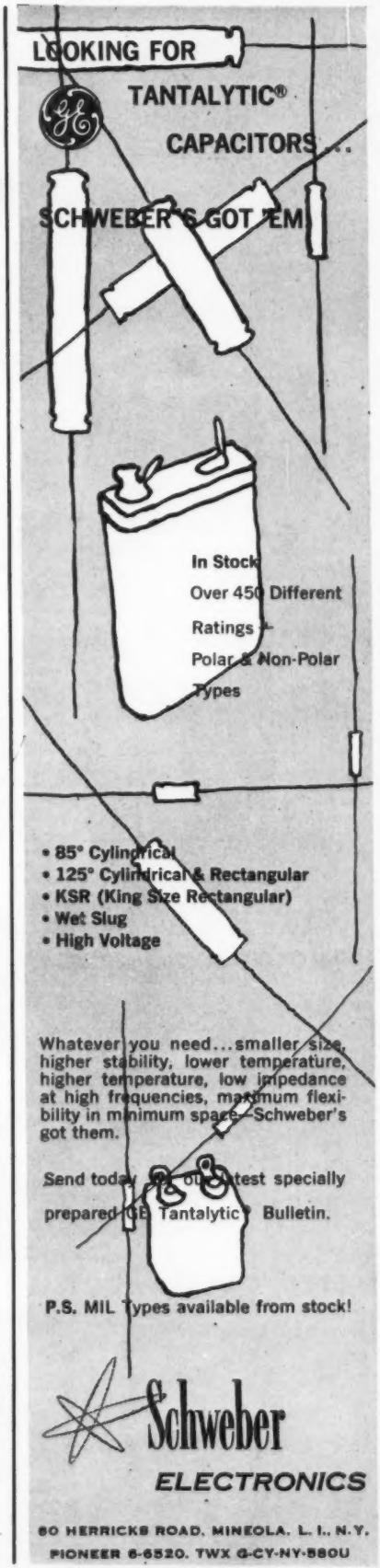
(Continued on page 17)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CAPACITORS . . .
SCHWEBER'S GOT 'EM
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Whatever you need...smaller size, higher stability, lower temperature, higher temperature, low impedance at high frequencies, maximum flexibility in minimum space—Schweber's got them.
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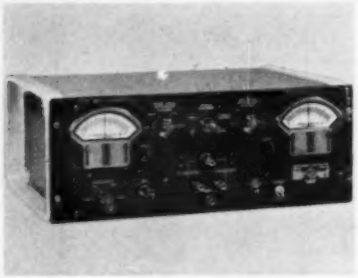
eem File System electronic engineers master Sec. 2900

IMPEDANCE COMPARATOR [*General Radio Company*]



Contains Signal Source, Bridge, And Detecting Circuit

This new version of the Impedance Comparator, Type 1605-AS2, serves to compare a resistor, capacitor, or inductor with a standard sample, indicating directly on panel meters the magnitude and deviation of impedance difference and phase-angle difference between them.

Basically a self-contained impedance measuring system, the instrument comprises a signal source, bridge, and detecting circuit. The bridge circuit consists of the standard and unknown external impedances, which are to be compared, and two precise transformer-type unity ratio arms. The voltages across these ratio arms are equal to within one part in a million. The internal oscillator provides 100 cps, 1-, 10-, and 100-kc frequencies, all ± 3%.

This new model also features full scale ranges of ±0.1%, ±0.3%, ±1.0% and ±3.0% for impedance magnitude, and ±0.001, ±0.003, ±0.01, and ±0.03 for phase angle. Accuracy is 3% of the full scale value; thus impedance difference can be measured to ±0.003% on the most sensitive range, and phase-angle difference to 0.00003 radian.

PRICE: $925.00; **AVAILABILITY:** 4-6 weeks
MFR: General Radio Company, Dept EP, West Concord, Mass.
SALES OFFICES: See **eem** p. 1596 (1960-61 Ed.)

Check 64 Reader Service Card 6/60

500 MC OSCILLOSCOPE [*Hewlett-Packard Company*]

Provides Viewing Of Repetitive Millimicrosecond Pulses

Designated as Model 185A this new 500MC Oscilloscope provides viewing of repetitive millimicrosecond pulses. This "sampling" scope is a single package conceived to permit operation with the convenience and familiarity of a conventional oscilloscope.

The unit has a rise time of less than 0.7 mμsec. It is useful wherever pulse analysis of fast circuits can speed engineering, research, design or performance testing. The device's full 10 centimeter vertical display and high vertical sensitivity permit pulse analysis in greater detail than previously possible, maker says. A fast rise sync pulse, suitably delayed from the start of trace, is available for triggering external circuits. In test circuits that will respond to this trigger, delay line unnecessary.

A Dual Trace Amplifier, the Model 187A, a plug-in unit for the new scope, provides simultaneous viewing of two phenomena, accurate time comparisons.

Features include newly-designed, versatile high impedance probes, an X-Y recorder output, sweep delay control and a beam finder.

PRICE: Oscilloscope $2000.00; Amplifier $1000.00
AVAILABILITY: 7 weeks
MFR: Hewlett-Packard Co., 275 Page Mill Road, Dept EP, Palo Alto, California
SALES OFFICES: See **eem** p. 1606 (1960-61 Ed.)
OTHER PRODUCTS: See **eem** Inside Front Cover, pp. 553, 884-893, 1023-1025, 1142

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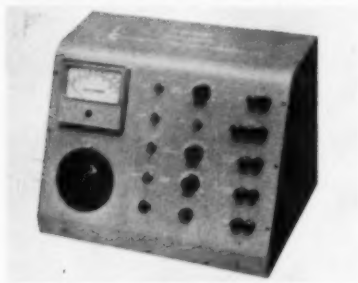
SERVO TESTER [*Industrial Control Company*]



For Frequency, Transient Response Tests On Open & Closed Loop Servo Systems

This new Model 100-C Servo Tester generates electro-mechanically the forcing and test voltages necessary to measure the frequency and transient response of a closed-loop servomechanism or its components. It is a precision instrument, moderately priced, which includes only those circuits unique to the servo test problem. It is used with standard cathode-ray oscillographs, a-c VTVM's and attenuator decades.

The unit operates from the 117-volt, 60 cps line. A clutch driven gear changer switches data frequency ranges. It accommodates both d-c and a-c servos with carrier frequencies to 5000 cps. A 214-B Demodulator is a valuable accessory for any servo laboratory, and is used in conjunction with the Model 100-C to generate the low frequency sinusoids necessary for frequency tests on d-c servos.

Data frequency is 0.01 to 1 and 0.3 to 30 cps, with the ranges changed by a front panel switch. Internal carrier frequency is 60 cps; external carrier frequency is 400 to 5000 cps. Controls include: data frequency, data phase, signal amplitude, and carrier phase.

PRICE: $900.00; **AVAILABILITY:** 8 weeks
MFR: Industrial Control Co., Central Avenue at Pinelawn, Dept EP, Farmingdale, New York
SALES OFFICES: See **eem** p. 1612 (1960-61 Ed.)

Check 66 Reader Service Card 6/60

HIGH SPEED MICRO-MICROAMMETER [*Keithley Instruments Inc.*]

Capable of Detecting Currents of Approximately 10^{-14} Ampere

Ideal for current measurements in ion chambers, photo-multipliers, gas chromatography and mass spectrometry, the new Model 415 micro-microammeter incorporates advanced high speed circuitry developed by this manufacturer for rocket and satellite experimentation — where Lyman-Alpha night glow and upper air density require fast response.

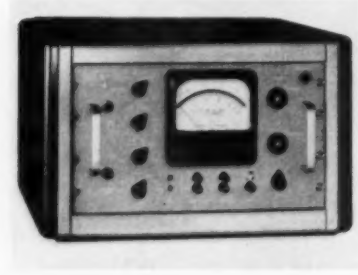
A speed of less than 600 milliseconds to 90% of final value at 10^{-12} ampere is possible where external circuit capacity is 50 picofarads (μμf). Critical damping of the circuit, with any input capacity, is maintained on all ranges with no possibility of oscillation or poor response on any range.

Accuracy is ±2% of full scale on 10^{-3} through 10^{-9} ampere range, and ±3% of full scale on 3 x 10^{-9} through 10^{-12} ampere range. Zero suppression, up to 100 full scales, permits full scale display on one percent variations of a signal. Drift is less than 2% full scale per day; there is one volt output at one milliampere. The unit includes a 1% mirror scale panel meter.

PRICE: $750.00; **AVAILABILITY:** From stock
MFR: Keithley Instruments, Inc., 12415 Euclid Avenue, Dept EP, Cleveland, Ohio
SALES OFFICES: See **eem** p. 1621 (1960-61 Ed.)
OTHER PRODUCTS: See **eem** pp. 914-916

Check 67 Reader Service Card 6/60

METER CALIBRATOR [*Mid-Eastern Electronics, Inc.*]



For Checking Operation Of Panel Meters, Portable Instruments

The Model 600 is a new Meter Calibrator designed for accurate check of the operation of panel meters, VOMs, VTVMs and portable instruments of 1.0% accuracy or less. Completely solid-state, the unit is compact for production floor use or as a general purpose laboratory power supply.

The device is self-contained, including its own power supply. A standard 7" precision mirror scale of 100 microampere sensitivity is provided. AC and DC voltage ranges are: 0-2.5; 0-5; 0-10; 0-25; 0-50; 0-100; 0-250; and 0-500. Direct current range is from 100 microamperes to 1 ampere. For checking ohmmeters, precision resistor ranges are provided from 25 ohms to 2.5 megohms.

Accuracy on all ranges is ±0.5% of full scale. This accuracy is maintained between 65° and 90°F. Output ratings are: 50 ma max. for A-C voltage ranges; 100 ma max. for D-C voltage ranges; and 750 mv max. for direct current. This unit is 10.5" high, 15" deep and 19" wide, and mounts in a standard 19" relay rack or is furnished in a metal or hardwood cabinet. Weight 60 lbs.

PRICE: $995.00 plus cabinet; **AVAILABILITY:** 90 days
MFR: Mid-Eastern Electronics, Inc., 32 Commerce St., Dept EP, Springfield, N. J.
SALES OFFICES: See **eem** p. 1637 (1960-61 Ed.)
OTHER PRODUCTS: See **eem** p. 1163

Check 68 Reader Service Card 6/60

TECHNICAL LITERATURE

(Continued from page 15)

ROTARY DC SOLENOIDS **Sec. 2200**

6-page brochure describes new line of highly precise rotary d-c solenoids, illustrating 5 basic frame sizes with detailed specs, dimensional drawings, typical torque characteristics, applications and special design features. Explains methods of achieving precise rotary motion from d-c rotary solenoids, without axial movement. **PSP Engineering Co.**, Dept EP, Maywood, Calif.

Check 119 Reader Service Card

PIEZOELECTRIC CRYSTAL STANDARDS Sec. 2300

Designated American Standard Method for the Determination of Elastic, Piezoelectric, and Dielectric Constants of Piezoelectric—The Electromechanical Coupling Factor, C83.23-1960, this new standard was approved under sectional committee method of ASA procedure, and developed by the IRE, sponsored by EIA. Available for 75c per copy from **American Standards Assoc.**, Dept EP, 10 E. 40th St., New York 16, N. Y.

DELAY LINES **Sec. 2350**

Bulletin #192, "Delay Lines—Basic Design Considerations" presents design engineer with information needed to calculate the circuit parameters and size of delay line which will meet his requirements. Booklet also discusses design compromises aimed at reducing size or expense. Marketing Dept. **Cornell-Dubilier Electric Corp.**, 4144 Glencoe Ave., Dept EP, Venice, Calif.

Check 120 Reader Service Card

PRECISION PURITY MICROFORMS **Sec. 2500**

4-page bulletin on precision purity microforms for semiconductor and electronic production, features facilities for production of ultra high purity spheres, discs, dots, and washers; tabs and base clad tabs. Metals used are indium, gold, tin, lead, silver, aluminum and doped alloys of these metals in p and n type. **Anchor Alloys, Inc.** 968 Meeker Ave., Dept EP, Brooklyn 22, N. Y.

Check 121 Reader Service Card

TECHNICAL CERAMICS **Sec. 2500**

6-page brochure on High Alumina Technical Ceramics covers data and application of these products to the electronics industry. Standard rods, tubes and cylinders are listed, as is a chart of comparative properties covering all factors – physical, electrical and environmental — of the materials, so that potential applications can be evaluated. A graph of dielectric loss factors on a comparative scale is also shown. **Diamonite Products Mfg. Co.**, Dept EP, Shreve, Ohio

Check 122 Reader Service Card

AXIAL FANS **Sec. 2600**

Comprehensive 16-page catalog contains over 65 different flow charts, electrical specs and dimensions on axial type fans covering a range of frequencies from 60 to 1,000 cps with free air ratings from 27 to 960 CFM. Information on construction, rotation, leads, lubrication and insulation class of these fans is given. **Air-Marine Motors, Inc.**, 369 Bayview Ave., Dept EP, Amityville, N. Y.

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(Continued on page 21)

Patents applied for

REMI®

re-entrancy miniature

REMI means the best in... **RE**movability, **RE**liability, **RE**entrancy

- Mechanical stresses are confined between metallic elements rather than between metal and plastic insulation.
- Sleeve, which is part of connector block, allows for interchangeability of male and female contacts on the same connector, at will.
- Additional polarization and keying can be accomplished with ease by use of dummy pins.
- Conforms to Mil Spec MIL-C-25955.
- Contacts are removed from mating or terminal side of connector at your discretion without tools.
- Terminals are designed to meet all types of crimp-on requirements. Terminals can be provided with solder cup, turret, eyelet design.
- All REMI design features combine to offer the ultimate in reliability under extreme environmental conditions.

U. S. COMPONENTS, INC.

Associated with U. S. Tool & Mfg. Co., Inc.

454 E. 148th St., New York 55, N. Y. CYpress 2-6525

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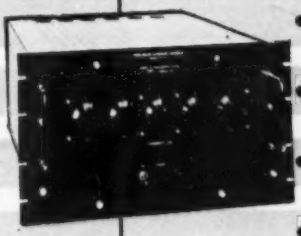

- **TRANSISTORS and DIODES**
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Programmable by Command Signal

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NORTH HILLS ELECTRONICS, Inc.

Glen Cove, L. I., N. Y. ORiole 1-5700

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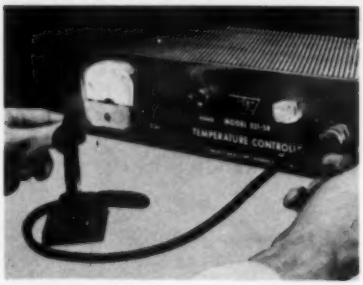
MINIATURE BLACK BODY SOURCE [*Perkin-Elmer Corporation*]

eem File System electronic engineers master Sec. 2900



For Calibrating Infrared Sensitive Elements In 200°C to 600°C Range

Calibration of seeking heads of infrared guided missiles and other infrared sensitive elements in the 200°C to 600°C temperature range, is now possible with this new miniature infrared source. The new black body source, called the Model PE 521-6 Miniature Infrared Source, provides an accurately adjustable source of infrared radiation when used with the Model PE 521-5 Temperature Controller.

The infrared source and temperature controller can be used as a secondary standard of radiant energy by comparison with a primary source, or by auxiliary temperature measurement of the conical radiating cavity. The two units form a closed loop servo system which senses the temperature of the radiating core by means of a platinum resistance thermometer. The servo system also maintains the selected temperature by proportional electronic control.

The source measures three inches long by three and one-half inches high. The temperature controller is housed in an 11-inch by 8-inch by 9-inch drawn aluminum cabinet. The two units are attached by means of a two-foot cable.

PRICE: $650.00; **AVAILABILITY:** 2-14 weeks
MFR: Perkin-Elmer Corporation, Main Street, Dept EP, Norwalk, Conn.
SALES OFFICES: See **eem** p. 1657 (1960-61 Ed.)

Check 69 Reader Service Card 6/60

200KV D-C VOLTMETER [*Peschel Electronics, Inc.*]

High Voltage Multiplier Resistor And Indicating Instrument

Features of this new 200,000 volt d-c voltmeter include: remote metering, convenient direct reading linear scale, rugged construction and conservatively rated components, safe operation, low drain, and reversible polarity.

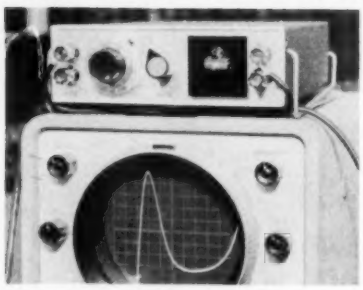
The voltmeter is composed of a high voltage multiplier resistor in a tall bakelite tube and an indicating instrument in a small metal cabinet at ground potential. The Model M200DC Kilovoltmeter has an input resistance of 2,000 megohms, a 4½ inch square indicating instrument, and will take an overload of 150 percent. A large corona shield minimizes corona and a neon gap overvoltage circuit protects the indicating instrument.

The multiplier circuit is completed to ground through a neon so that high voltage cannot appear on the indicating instrument even if it should "open up." The size of the resistor unit is 18" by 18" base by 48" high. The control cabinet is 8" by 8" by 8".

PRICE: $825.00; **AVAILABILITY:** 6 weeks
MFR: Peschel Electronics, Inc., RFD 1, Dept EP, Patterson, New York
SALES OFFICES: See **eem** p. 1657 (1960-61 Ed.)
OTHER PRODUCTS: See **eem** pp. 950, 951, 1184

Check 70 Reader Service Card 6/60

TUNNEL DIODE CURVE TRACER [*Texas Instruments Inc., Geosciences & Inst. Div.*]



For Study Of Forward Characteristics of Tunnel Diodes

The study of forward characteristics of tunnel diodes made by various manufacturers, including gallium arsenide tunnel diodes recently introduced by this manufacturer, is now possible by this new tunnel diode curve tracer. A plug-in adapter can be changed to accommodate different package configurations. One adapter is included with the original equipment; others may be purchased as required.

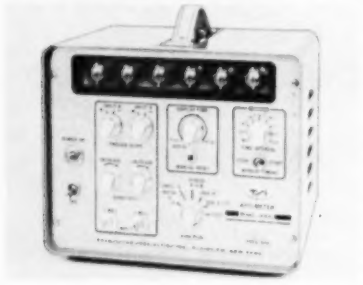
Any sensitive oscilloscope may be used with the tunnel diode curve tracer to create current and voltage waveforms. This instrument creates a sharp representation of the entire critical region of the forward characteristic curve of the tunnel diode under test rather than just a portion of that curve.

Through the use of an external decade box shunted across the horizontal terminals, it is practical to read the actual negative resistance of the tunnel diode at any point on the curve. This shunt can be provided as an optional feature at additional cost.

PRICE: $99.50 to $137.50; **AVAILABILITY:** From stock
MFR: Texas Instruments Inc., Geosciences & Instrumentation Div., 3609 Buffalo Speedway, Dept EP, Houston, Texas
SALES OFFICES: See **eem** p. 1701 (1960-61 Ed.)

Check 71 Reader Service Card 6/60

1 MC COUNTER-TIMER [*Transistor Specialties, Inc.*]



All Solid State Circuitry — Nixie In-Line Readout

A full five year guarantee accompanies each of these counter-timers which feature all solid state circuitry, in-line Nixie readout and extreme versatility in both laboratory and industrial application.

The new counter, Model 361, which has been designed to meet virtually any requirement within its count range, for measurement, calibration, timing and control, performs all the functions of a counter, frequency meter, time-interval meter, secondary frequency standard, period counter and ratiometer, without the need for accessory equipment or plug-ins. High counting accuracy is achieved through use of a transistorized, crystal controlled clock, which can be supplied either with or without temperature stabilizing oven to meet particular requirements.

Measuring only 8" by 10" by 8", and weighing 11 pounds, the unit is readily portable for multi-station plant and laboratory use. Because low drain transistor circuitry is used throughout, operating power is only 19 watts at 115 volts, 50 to 60 cps. Accuracy is specified at ±1 count ±3 parts in 10^7 per week.

PRICE: $1450.00; **AVAILABILITY:** 2 weeks
MFR: Transistor Specialties, Inc., Terminal Drive, Dept EP, Plainview, New York
SALES OFFICES: See **eem** p. 1705 (1960-61 Ed.)

Check 72 Reader Service Card 6/60

Additional New TEST EQUIPMENT PRODUCTS

Module Type Oscilloscopes using 3UP1 2⅛" x 1¼" and 3XP1 3" x 1½" rectangular tubes take up panel space of 3 x 5" for No. 90912-R and 3x6" for No. 90913. Basic scopes, include CRT circuit, power supply, intensity, focus and centering controls, magnetic shielding, safety features, switches, etc. **PRICE:** $21.00 to $50.00; **AVAILABILITY:** Stock; **MFR:** James Millen Mfg. Co., Inc., 150 Exchange St., Dept EP, Malden 48, Mass. **SALES OFFICES:** See **eem** p. 1638.

Check 161 Reader Service Card

Wide-Band Amplifier, Type 1121 is a low-noise, 2-stage, cascode input unit designed to increase amplitude of low-level wide-band signals. Also ideally suits applications requiring voltage gain up to 100. Turret type step attenuator permits attenuation of input level to a factor of 500X in nine calibrated steps. **PRICE:** $425.00; **AVAILABILITY:** Stock; **MFR:** Tektronix, Inc. Box 831, Dept EP, Portland 7, Ore. **SALES OFFICES:** See **eem** p. 1699.

Check 162 Reader Service Card

Digital Clocks for use with H-P Digital Recorders add time-of-day information to other recorded data. Indicate time to 23 hrs. 59 min. 59 sec. (12-hr units on special order). Display by long-life, in-line indicator tubes. All time digits are available for printing. Two operating modes, one for external control of print rate, second for clock control of timing of readings. **PRICE:** Model 570A (fits hp 560A/AR), $1,050.00; Model 571B (for hp 561B/BR), $950.00; **AVAILABILITY:** 15 weeks; **MFR:** Hewlett-Packard Co., 275 Mill Page Rd., Dept EP, Palo Alto, Calif. **SALES OFFICES:** See **eem** p. 1606. **OTHER PRODUCTS:** See **eem** pp. 553, 884-893, 1023-1025, 1142.

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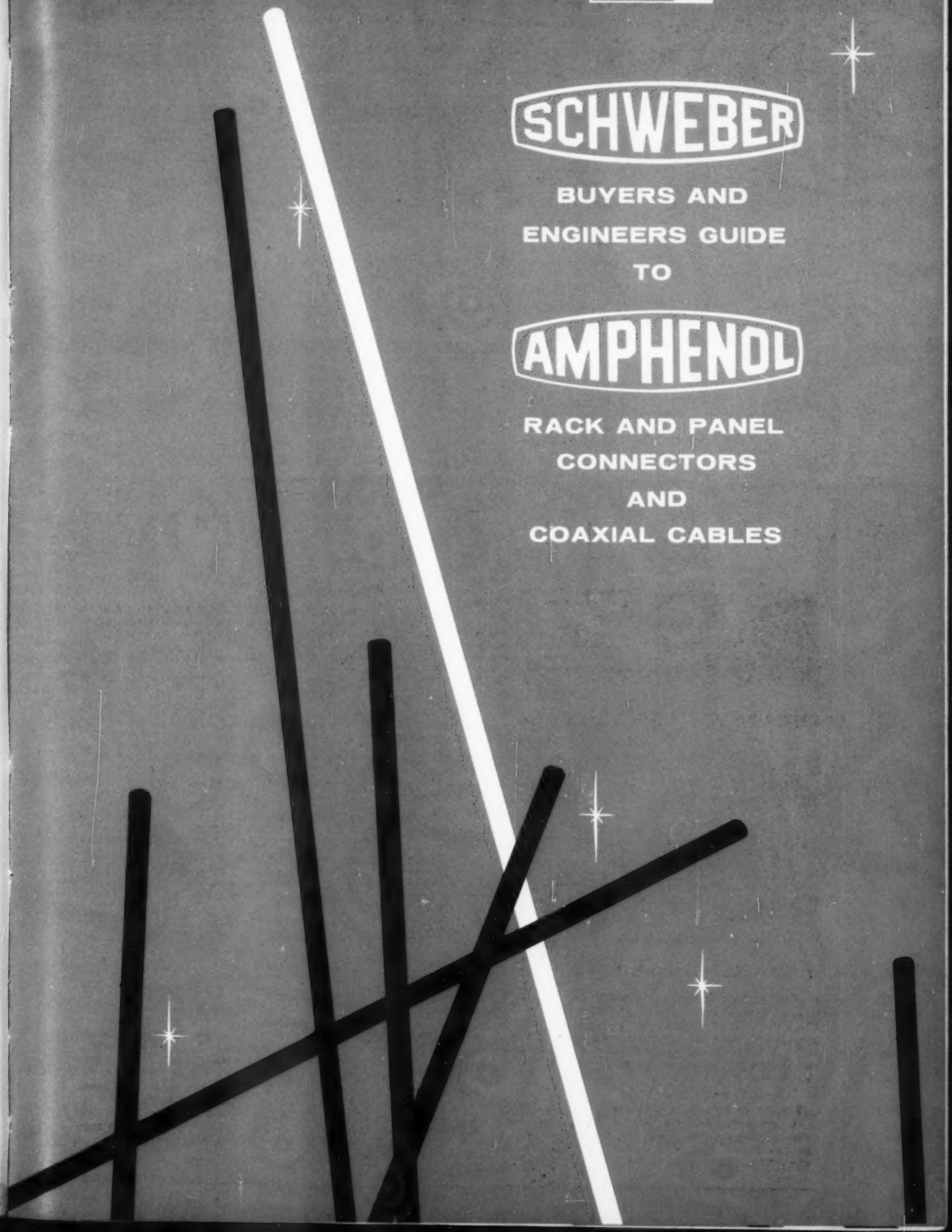
This is an engineering sheet removable for ready reference

eem File System Sec. 2100
electronic engineers master



SCHWEBER

BUYERS AND ENGINEERS GUIDE TO

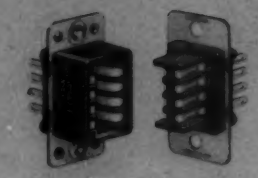
AMPHENOL

RACK AND PANEL CONNECTORS AND COAXIAL CABLES

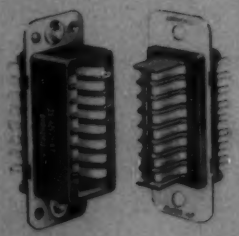
BLUE Ribbon

AMPHENOL

26 SERIES



26-4200-8S 26-4100-8P

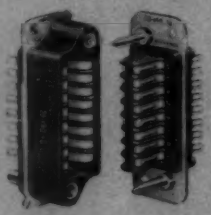


26-4200-16S 26-4100-16P

Barrier Polarization Type without Shells

The interlocking design of mating dielectric bodies in this series provides positive polarization in a compact manner. The dimensional stability of AMPHENOL blue dielectric plus its high tensile strength makes this type of polarization equal to any other types with many advantages. Not being dependent on contact arrangement, visual alignment is unnecessary and the ribbon contact principle itself eliminates the possibility of bent contacts preventing or making plug-in difficult.

Pin Polarization Type without Shells

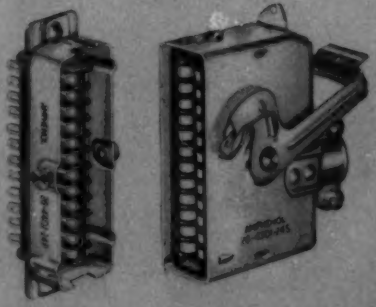


26-150-16 26-159-16

Barrier Polarization Type with Latch-Type Keyed Shells

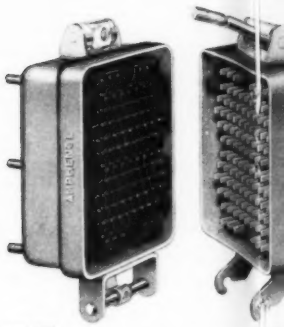
The spring tension locking mechanism of this group is more than adequate for the most severe conditions of vibrations. As an added safety measure, the latches are designed to facilitate safety wiring. The nickel-plated brass shells offer a wide range of polarization keys for each insert making it possible to mount a large number of receptacles on a single panel with no danger of mating the plug-in member with the wrong receptacle.

Plugs and receptacles of this series can be supplied with either male or female inserts. Can be furnished with adapters for contact taper pin assembly.



26-4401-24P 26-4301-24S

115 SERIES



115-31S

100 CONTACT

Amphenol 115 S
modate 100 No.
ally rated at 750
level. They re are
in the utilizat on
tions where
must be broken
Also available to
wires. Both 100
tors are availa ble

The 115 S
contact
Cable Cl
tors. Ho
AN-type

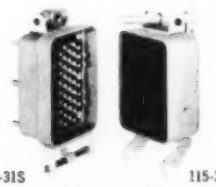
Schweber ... 1 ST

SCHWEBER

115-30P

ITACT

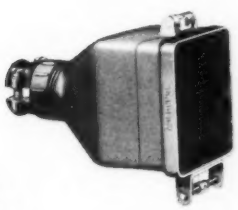
phenol 115 Series connectors accom-
date 100 No. 16 wire and are nomin-
rated at 750 volts RMS 60 CPS at sea
l. They represent maximum efficiency
he utilization of space for all applica-
s where a large number of circuits
st be broken quickly and conveniently.
available to accommodate 50 No. 16
s. Both 100 and 50 contact connec-
are available with Cable Clamps.



115-31S 115-30P

50 CONTACT

CABLE CLAMP



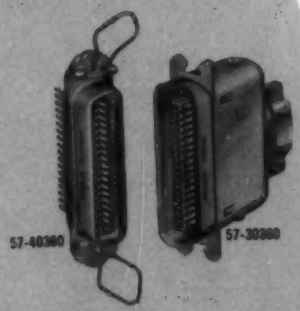
The 115-949 Cable Clamp fits the 100 contact connectors and the 115-1391 Cable Clamp fits the 50 contact connectors. Housings are aluminum with an AN-type clamp.

ST

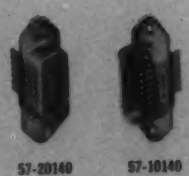
for connectors

Micro RIBBON

These extremely small connectors were designed to allow utilization of the unique "ribbon" contact features in miniaturization programs, particularly in airborne electronics and computer projects, for increased reliability. The smooth, easy insertion and extraction action, the self-wiping, self-cleaning features and the double-sided, flexing action of both mating contact members make Micro-Ribbons the first miniature connectors to provide reduction in size with added reliability. Available in 14, 24, 36 and 50 contacts.

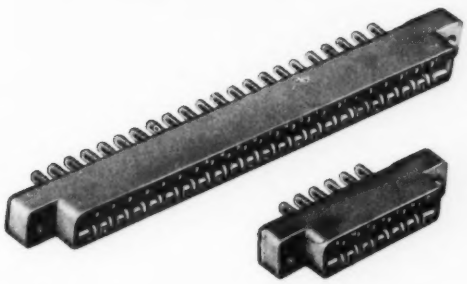


57-40360 57-30360



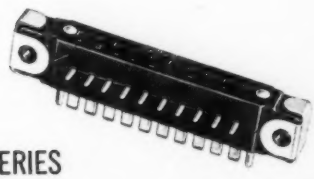
57-20140 57-10140

PRIN-CIR



143 SERIES

The result of careful design work by AMPHENOL Development Engineering, prin-cir (printed circuit) connectors feature compact bodies molded of an improved version of diallyl phthalate dielectric, and a new contact that is greatly superior to any currently available for printed circuit applications.



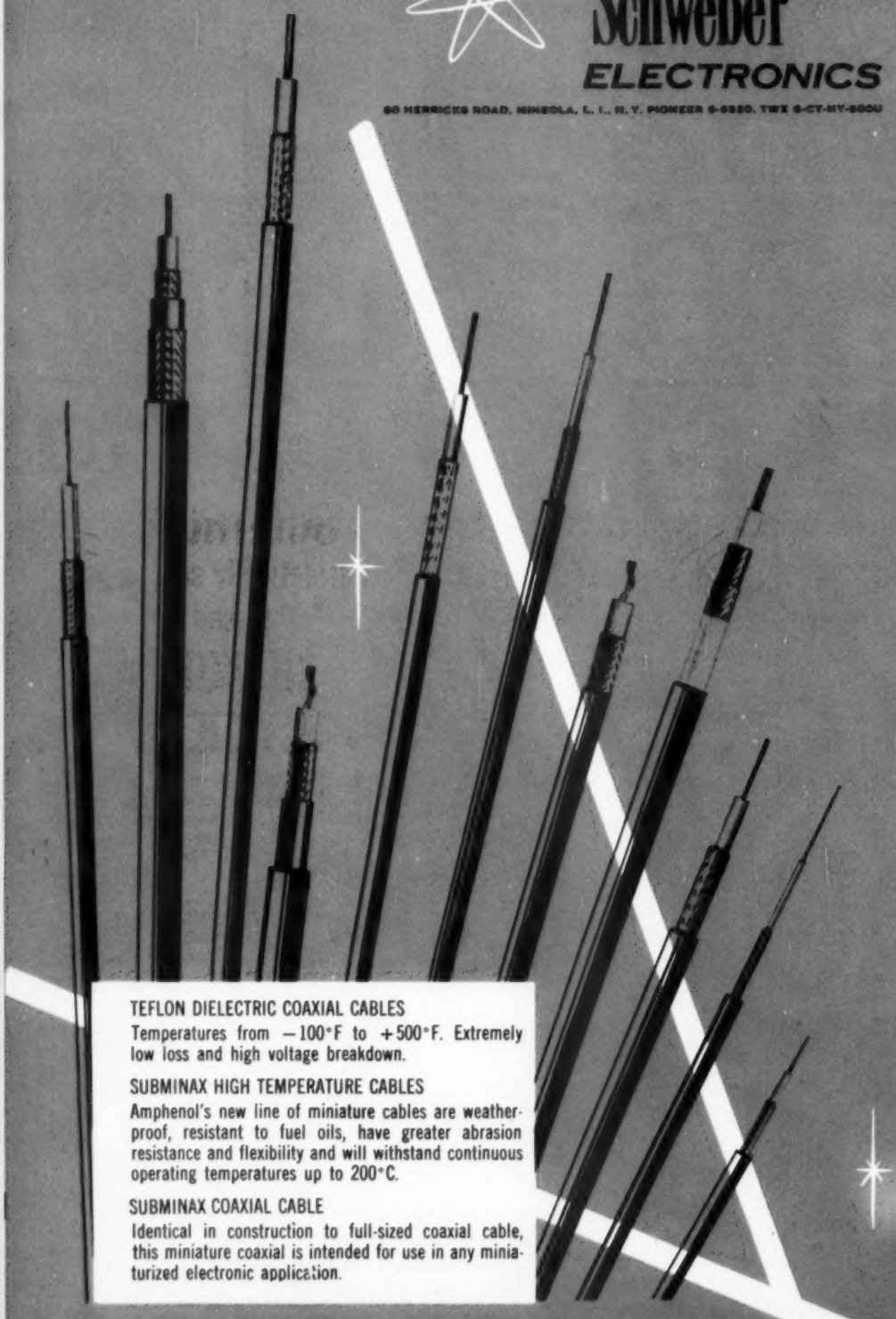
133 SERIES

The 133 series represents a new line of plugs and adapters which mate with the 143 series receptacles and which provide increased reliability of printed wiring connectors. Presently available in 10, 15, 18 and 22 contacts in 6 different tail arrangements.

Did you know that you can obtain all these Coaxial, Teflon Coaxial and Miniature Cables from Stock in Quantity at Factory Prices from SCHWEBER?

Schweber ELECTRONICS

60 HERRICKS ROAD, MINEOLA, L. I., N. Y. PIONEER 6-9330. TWX G-CY-NY-6004



TEFLON DIELECTRIC COAXIAL CABLES

Temperatures from −100°F to +500°F. Extremely low loss and high voltage breakdown.

SUBMINAX HIGH TEMPERATURE CABLES

Amphenol's new line of miniature cables are weatherproof, resistant to fuel oils, have greater abrasion resistance and flexibility and will withstand continuous operating temperatures up to 200°C.

SUBMINAX COAXIAL CABLE

Identical in construction to full-sized coaxial cable, this miniature coaxial is intended for use in any miniaturized electronic application.

RG-/U TYPE COAXIAL CABLES

Military RG- Number	AMPHENOL Number	Nominal Impedance in Ohms
5B	21-294	50
6A/U	21-330	75
8/U	21-004	52
8A/U	21-290	52
9/U	21-005	51
9A/U	21-231	51
9B/U	21-332	50
10A/U	21-338	52
11/U	21-007	75
11A/U	21-296	75
12A/U	21-340	75
13/U	21-009	74
13A/U	21-334	74
14A/U	21-336	52
17/U	21-013	52
17A/U	21-298	52
18A/U	21-300	52
19A/U	21-303	52
20A/U	21-305	52
21A/U	21-308	53
22/U	21-038	95
22B/U	21-310	95
34B/U	21-792	75
35B/U	21-793	75
55B/U	21-802	53.5
57A/U	21-313	95
58/U	21-024	53.5
58A/U	21-199	50
58C/U	21-361	50
59/U	21-025	73
59B/U	21-794	75
62/U	21-026	93
62A/U	21-318	93
62B/U	21-771	93
63/U	21-027	125
63B/U	21-320	125
71A/U	21-723	93
71B/U	21-804	93
74A/U	21-321	52
79B/U	21-325	125
87A/U	421-250	50
†94/U	421-158	50
108A/U	21-327	78
111A/U	21-329	95
114/U	21-440	185
114A/U	21-520	185
115/U	421-641	50
115A/U	421-699	50
116/U	421-378	50
117/U	421-377	50
†118/U	421-374	50
119/U	421-398	50
†120/U	421-399	50
122/U	21-441	50
†126/U	421-443	50
140/U	421-379	75
141/U	421-382	50
141A/U	421-139	50
142/U	421-385	50
142A/U	421-140	50
143/U	421-388	50
143A/U	421-141	50
144/U	421-391	75
149/U	21-467	75
164/U	21-720	75
†165/U	421-710	50
†168/U	421-713	50
174/U	21-598	50
†177/U	21-708	50
178A/U	421-148	50
179A/U	421-149	75
180/U	421-144	93
180A/U	421-147	95
187/U	421-106	75
188/U	421-105	50
195/U	421-111	95
196/U	421-109	50
210/U	21-100	93
211/U	421-131	50
212/U	21-790	50
213/U	21-779	50
214/U	21-780	50
215/U	21-781	50
216/U	21-782	75
217/U	21-783	50
218/U	21-784	50
219/U	21-785	50
220/U	21-786	50
221/U	21-787	50
222/U	21-791	50
223/U	21-788	50
224/U	21-789	50
225/U	421-135	50
226/U	421-136	50
227/U	421-137	50
†230/U	421-138	50

CURRENT PRICES

of 400,000 standard stock electronic products available from distributors

How much time are you now spending on phone calls . . . writing letters . . . checking through catalogs for current prices of standard stock electronic products?

This is wasted time that PRICING SERVICE can convert to profitable operation.

PRICING SERVICE is organized to save engineering and purchasing time.

- over 400,000 electronic products available from local parts distributors — listed with catalog number and current prices.
- complete product lines of more than 750 manufacturers of electronic components and equipment.
- all price changes — ups, downs, new items, discontinued items — mailed to you twice weekly.
- easy to maintain and keep up to date with compression-type loose leaf binder.

PRICING SERVICE speeds your daily routine

- excellent guide for estimating for prototypes and short production runs.
- simplifies the pricing of bills of materials.
- ideal for price comparison of different makes of the same type product.
- eliminates time-consuming correspondence.
- ideal for pricing inventory and checking incoming invoices.

Here are some of the leading manufacturers, government agencies and institutions now relying on PRICING SERVICE

AC Spark Plug
Arma
Boeing
CBS Television
Convair
Delco Radio
Eclipse-Pioneer
Eastman Kodak
Esso Std. Oil
Fairchild Guided Missile
Firestone Tire
General Electric
Harvard Univ.
Internat'l Bus. Machines
Kearfott
Mass. Inst. of Tech.
Motorola
Nat'l Broadcasting Co
Nat'l Cash Register
Pacific Tel. & Tel.
Philco
Ramo-Wooldridge
Reeves Instrument
Shell Oil
Univ. of Maryland
Western Electric
Westinghouse
White Sands Pvg. Gr.
U.S.A. Sig. Supply
U.S. Central Intell.
U.S.N. Test Station

PRICING SERVICE *can save you time and money. Rates: $8.50 to $12.50 a month, based on number of subscriptions. For complete details, write to:*

PRICING SERVICE
55 Sewell Street • Hempstead, New York

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Problems & Solutions

(Continued from page 13)

SOLUTION B: Suggest that the inquirer use a brake to bring the motor to a stop as quickly as is consistent with safety and transfer the armature circuit to instruments by means of a reliable, quick-acting switch. The instrument circuit would require a d-c voltage source, a d-c voltage amplifier and a recording voltmeter. The voltage drop caused by the armature cooling off would be marked on the chart in permanent form and could be easily converted into the temperature equivalent.

Gene Cunningham
211 W. Bridge St., Plainwell, Mich.

(Problem 147)

SUBMINIATURE TRIMMING POTENTIOMETER

Our Purchasing Department advises that they have exhausted their possibilities of procuring a subminiature trimming potentiometer that will meet the following specifications:

a) Range: 10 to 50K ohms

b) Size, maximum, ½" by ½" by ¼"

c) Environmental Conditions, MIL-E-5272B (generally), except the operational temperature range of −55°C to 100°C.

d) Application, printed circuit board in airborne equipment

e) Ultrasonic Cleaning, prior to fungus proofing and packaging, in chlorothene at 40 kc for one to two minutes.

Many vendors can meet a) through d); item e) is the problem.

SOLUTION C: Suggest inquirer contact Analogue Controls, Inc., 200 Frank Road, Hicksville, N. Y. They manufacture a ½" diameter trim pot which I believe will meet the required specifications.

J. P. Cox
TransDynamics Inc., Burbank, Calif.

SOLUTION D: It has been found that the subminiature trimmer potentiometers (Wells-Series ±TVR-050) will do everything your problem requires except Subject "E". Series ±TVR-050 will satisfy "E" wherein perchloroethylene is used so it is believed chlorothene is no more severe. TVR-050 is made by Wells Industries Corp., 6880 Troost Ave., No. Hollywood, Calif.

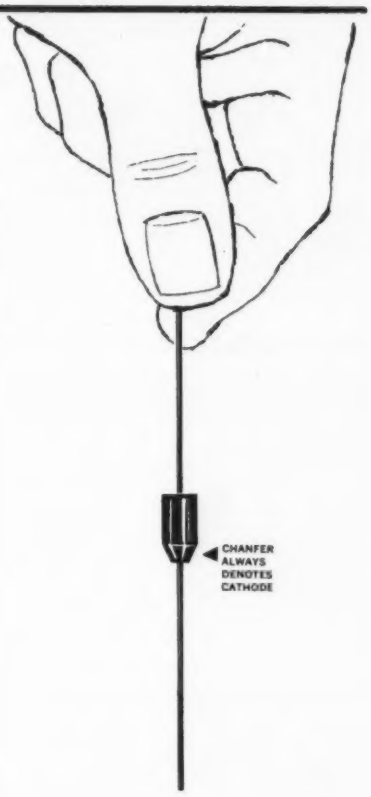
C. E. Coy, Staff Eng.
The Martin Co., Components Applications, Orlando, Fla.

(Problem 148) TIME DELAY RELAY

Where is there a low cost but high accuracy (1% or better) fixed or variable time delay relay having a delay of one minute operating from 28 vac or 28 vdc? The relay is for ground support equipment. Therefore, it doesn't need excess environmental performance. The reliability of the countdown will depend to a great extent on the accuracy of this unit.

SOLUTION A: One of our product lines was specifically developed to cover the needs of equipment requiring fixed or adjustable time periods up to one minute with a high degree of accuracy (1%) and at low cost. Our Solid State Time Delay Relays (Economy

(Continued on page 23)



SOLITRON

hermetically sealed, diffused

SILICON RECTIFIERS

Solitron Devices—the first to introduce a hermetically sealed, diffused silicon rectifier by a new process of pressure molding under heat and vacuum — our own thermal set formula.

- Hermetically sealed — miniature from 1 volt PIV to 10,000 volts PIV at 1 MA to 750 MA. Solidpaks available to higher voltage, and to customer specifications.
- Will exceed 202-103-A humidity test 90% relative humidity at 40°C for 240 hours.
- Will exceed thermal shock test 150°C to −65°C with cycling.
- Will exceed pressure bomb test 120 lbs. of pressure under water for over 4 hours.

*Tested by a leading independent laboratory for hermetically-sealed qualities.

Sales reps in all key cities, write for literature.

SOLITRON DEVICES, INC.
67 South Lexington Ave., White Plains, N.Y.

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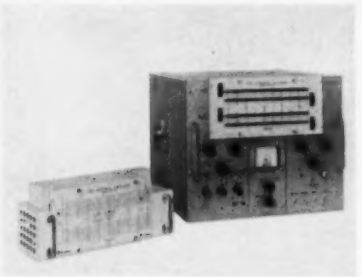
MICROWAVE OSCILLATOR [*Alfred Electronics, Inc.*]

eem File System Sec. 3400



Generator Heads Provide Continuous Coverage From 1 to 18 KMC

The new general frequency Microwave Oscillator, Model 605, with five plug-in generator heads provides continuous coverage from 1 to 18 KMC for rapid measurement of gain, power output, standing wave ratio, reflection co-efficient and transfer characteristics of most microwave devices.

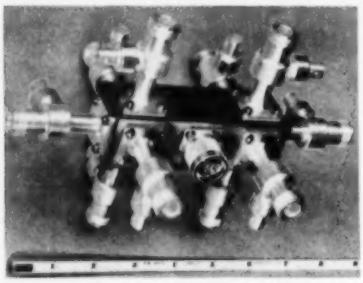
Each generator head, consisting of a BWO tube and solenoid, inserts into a recess in the rear of the oscillator. Heads are available in standard steps of 1 to 2 KMC, 2 to 4 KMC, 4 to 8 KMC, 8 to 12.4 KMC, 6.5 to 11.5 KMC and 12.4 to 18 KMC. Heads are also available for 1.5 to 2.5 KMC and 10 to 15.5 KMC.

The sweep frequency of the unit is continuously adjustable from 0 to band width extremes with an accurate direct reading slide rule dial. A "Quick Look Readout" eliminates calculations in setting sweep range. Two adjustable frequency markers are provided for rapid, broadband calibration of a scope or recorder trace during observation of microwave component characteristics. Internal square wave modulation is available.

PRICE: $1750.00 (Model 605); $1590 to $1990.00 (heads)
AVAILABILITY: 45 days
MFR: Alfred Electronics, Inc., 897 Commercial St., Dept EP, Palo Alto, California
SALES OFFICES: See **eem** p. 1519 (1960-61 Ed.)

Check 73 Reader Service Card 6/60

SINGLE POLE MULTIPLE THROW SOLID STATE SWITCHES [*American Elec. Labs., Inc.*]



For Antenna Lobing Or Switching—Freq. Ranges 10 MC To 10,000 MC

A new development by this manufacturer is a line of Single Pole Multiple Throw Solid State (crystal) Microwave Switches. In addition to the single pole ten throw unit shown, the firm has built double throw and four throw switches.

These switches are generally characterized by their rapid switching time (less than 10 millimicroseconds), low insertion loss when "on" coupled with high "off" attenuation, broad RF bandwidth and the small amount of switching power required.

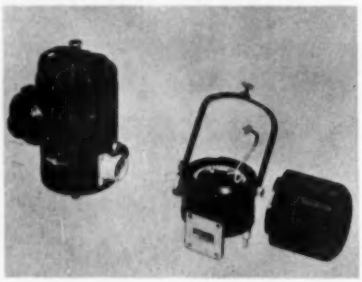
The ten throw switch shown, operating around 450 mc, presents a total insertion loss of less than 2 db in the line with one leg "on" and the other nine "off". VSWR of the open branches measure greater than 250:1.

These switches are ideal for antenna lobing or switching, channel switching, continuously variable voltage controlled attenuation (AGC) and many other applications. Units are available in various frequency ranges from 10 mc to 10,000 mc.

PRICE: From $250.00 (depending on requirements)
AVAILABILITY: 1 to 2 weeks (standard units), 4 to 6 weeks (special units)
MFR: American Electronic Labs., Inc., 121 N. 7th St., Dept EP, Phila. 6, Pa.
SALES OFFICES: See **eem** p. 1523 (1960-61 Ed.)
OTHER PRODUCTS: See **eem** p. 1007

Check 74 Reader Service Card 6/60

KLYSTRON TUBE MOUNTS [*DeMornay-Bonardi Corporation*]



Couples Output Of Small Reflex Klystron To Standard Size Waveguide

Designated as DB-111, this new line of klystron tube mounts provides a convenient means of coupling the output of a small reflex klystron to a standard size waveguide. The tube mounts are fully pressurized, allowing direct connection to a pressurized system. The cover can be opened to change the tube without affecting waveguide pressurization. Tuning is stable regardless of pressure variations in the system.

The design provides for excellent r-f shielding by means of 1) beryllium copper spring fingers which form an electrical seal between the body of the tube mount and the cover, and 2) filtering of the input connector by the use of a special absorbing material placed around the input leads. The design also includes efficient heat dissipation, and a multi-turn dial on the tuning shaft for accurate resettability.

The units are insulation tested at 1500 volts peak. The shell of the klystron is fully insulated from the metallic parts of the mount. Units are available with various mounting arrangements. Five sizes for tubes in frequencies ranging from 2.6 to 9.6 Kmc.

PRICE: $237.00 to $315.00 **AVAILABILITY:** 30 days
MFR: DeMornay-Bonardi Corp., 780 Arroyo Parkway, Dept EP, Pasadena, California
SALES OFFICES: See **eem** p. 1565 (1960-61 Ed.)
OTHER PRODUCTS: See **eem** pp. 1010, 1011

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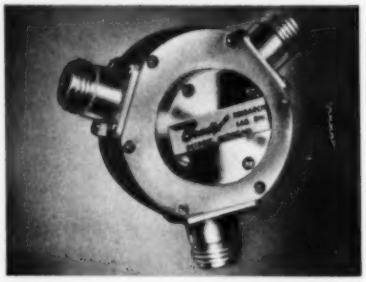
C-BAND Y-CIRCULATOR [*Bendix Aviation Corp., Research Labs Div.*]



For Use With Masers and Parametric Amplifiers

Operating in a frequency range from 4700 to 5700 megacycles per second, the new C-Band Y-Circulator, Model TFC-1, is a ferrite device featuring exceptional electrical performance in a compact size. It has a minimum isolation of 22 db and a maximum insertion loss of 0.4 db over a bandwidth in excess of 20 percent; the VSWR is 1.15.

This compact microwave device weighs 11 ounces and is 1.9 inches in height with a diameter of 2.3 inches (less connectors.) It has a temperature range of −55°C to 125°C. Its average power handling capability is 30 watts; peak power handling capacity is 30 kilowatts; impedance is 50 ohms. Coaxial type N connectors are utilized.

The device is particularly suited for missile and space vehicle applications and for use with masers and parametric amplifiers. If one of the ports is properly terminated, it will also serve as a broadband isolator.

PRICE: Contact Sales Offices below
AVAILABILITY: 30 days
MFR: Bendix Aviation Corporation, Red Bank Division, Dept EP, Eatontown, N. J.
SALES OFFICES: See **eem** p. 1536 (1960-61 Ed.)
OTHER PRODUCTS: See **eem** p. 1432

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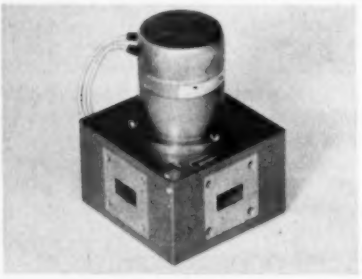
WAVEGUIDE SWITCHES [*FXR, Inc.*]



Broadband Operation-Frequency Range 3.95 to 40 KMC

A new FXR Series 641 waveguide switches covering the frequency range from 3.95 to 40 KMC, has been added to this firm's line.

Broadband operation, low VSWR, excellent isolation and high capacity are the principle characteristics of these units. They are available for either manual or electrical operation in each of the seven frequency ranges they cover.

The rotor which changes the direction of the RF signal from one waveguide to another inside the switch is uniquely choked to obtain a high degree of isolation between the separate ports of the switch. Low VSWR is obtained by milling each switch arm to a very close tolerance. The milled aluminum rotor is mounted on precision ball bearings for smooth action and a long trouble-free life.

Each switch operates over its full waveguide bandwidth. Its maximum VSWR is 1.10. The minimum isolation is 60 db for frequency ranges from 3.95 to 26.50 KMC and 50 db from 26.50 to 40 KMC.

PRICE: $225.00 to $350.00 (manual); $250.00 to $400.00 (electrical)
AVAILABILITY: 30 days (X-band); All others contact Sales Offices below
MFR: FXR, Inc., 26-12 Borough Pl., Dept. EP, Woodside 77, New York
SALES OFFICES: See **eem** p. 1583 (1960-61 Ed.)
OTHER PRODUCTS: See **eem** pp. 1019-1022

Check 77 Reader Service Card 6/60

(Continued from page 17)

MECHANICAL FILTERS **Sec. 2700**

New spec sheet (Bulletin CR-WD-1005) listing all maker's mechanical filters in easy-reference tabular form, covers more than 90 different filters, with center frequencies, bandwidths at 6 db and 60 db, and case styles called out. Included are 20 SSB filters with carrier frequencies ranging from 60 kc to 455 kc. Illustrations with detailed dimensions included. **Collins Radio Co.**, Western Div., 2700 W. Olive Ave., Dept EP, Burbank, Calif.

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TERMINALS, BOARDS, STRIPS **Sec. 2800**

This 36-page, 2 color catalog features the maker's line of terminals, terminal boards and strips, banana jacks and plugs and other parts for military and commercial precision products. Also contains charts of basic information on typical values of laminates, including physical and electrical properties of those used in parts listed. **National Tel-Tronics Corp.**, 52 St. Casimir Ave., Dept EP, Yonkers, N. Y.

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TIME CODE GENERATOR **Sec. 2900**

Data Sheet describes the ZA-810 time code generator in a proposed IRIG time code. The unit produces a 36-bit time code, reading days, hours, minutes and seconds in a binary-coded-decimal form. Accuracy is three parts in 10^9 per day; provision is made for synchronization with WWV. Suitable for time correlation of readings from various sources, the unit is completely solid-state, with outputs suitable for recording on strip chart recorders, magnetic tape, or as drivers for neon flash lamps in cameras. **Electronic Engineering Co. of Calif.**, 1601 E. Chestnut St., Dept EP, Santa Ana, Calif.

Check 129 Reader Service Card

SAMPLING OSCILLOGRAPHY **Sec. 2900**

This 8-page Application Note (#36) titled "Sampling Oscillography" covers a method for pulse analysis of ultra fast circuits—as with transistors, diodes, memory units, fast computer circuits, surveillance radars, and other millimicrosecond pulse applications. Traces history of the sampling technique, its recent application to oscilloscopes; also discusses general sampling considerations and describes design and operation of H-P's Model 185A sampling oscilloscope. **Hewlett-Packard Co.**, 275 Page Mill Road, Dept EP, Palo Alto, Calif.

Check 126 Reader Service Card

TECHNICAL REVIEW **Sec. 2900**

20-page technical review describes the concepts of amplitude density analysis of non-periodic noise. An instrumentation system for automatically plotting amplitude density curves is described and typical applications of the system discussed. **B & K Instruments, Inc.**, 3044 W. 106th St., Dept EP, Cleveland, Ohio.

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(Continued on page 23)

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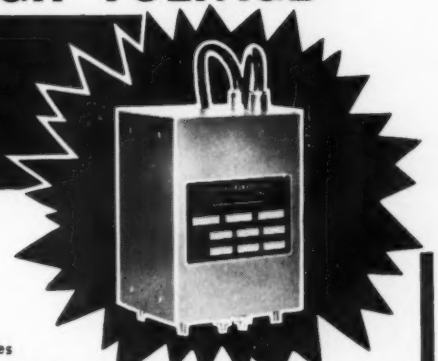
COMPACT HIGH VOLTAGE POWER SUPPLIES



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Model No.	*Output*	*Dimension* W D H
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5-2-1	5KV-2MA	3 1/16 x 3 1/16 x 3 7/8
10-1-1	10KV-1.25MA	3 1/16 x 3 1/16 x 4 7/8
15-1-1	15KV-1.25MA	4 x 5 x 5 3/4
20-1-1	20KV-1.25MA	4 1/4 x 5 1/8 x 6 3/4
25-1-1	25KV-1.25MA	4 3/4 x 6 x 7 1/4
30-1-1	30KV-1.25MA	5 x 6 1/2 x 7 3/4

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MICROWAVE MIXER ASSEMBLY [*LEL, Inc.*]

eem File System Sec. electronic engineers master 3400

IF Center Frequency 30 Or 60 MC—Minimum Gain of 25 DB

Use of this manufacturer's matched-mixer assemblies should enable the designer of a microwave or guidance receiver to obtain known optimum overall performance from a system, often at a considerable savings in time and expense. Integrating the mixer and preamplifier into one assembly removes variable parameters which frequently result in an asymmetrical pass band, a poorer noise figure than predicted, and a restricted bandwidth.

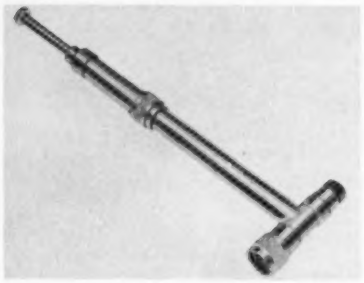
The MMC-2 is an integrated waveguide mixer-preamplifier designed to deliver optimum performance over the r-f spectrum from 5.15 to 5.85 kmc. Each unit is tested for noise figure, VSWR, power gain and i-f bandwidth over this range, and measurement data are supplied. While 30- or 60-mc intermediate frequencies are standard, other output frequencies are available.

The minimum over-all power gain is 25 db. The noise figure is 7.5 db maximum; typically it is less than 7 db. The over-all bandwidth is 8 mc ± 1 mc at 3 db. Signal input VSWR is 1.2; LO input VSWR is 1.25.

PRICE: $1490.00; **AVAILABILITY:** 60 days
MFR: LEL Inc., 380 Oak Street, Dept EP, Copiague, New York
SALES OFFICES: See **eem** p. 1626 (1960-61 Ed.)
OTHER PRODUCTS: See **eem** p. 1029

Check 78 Reader Service Card 6/60

COAXIAL TUNERS—STUB STRETCHERS [*Microlab*]



Combines Adjustable Shorted Stub and Line Stretcher

The conventional stub tuner requires at least two stubs, each of which must be at least one-half a wavelength long. The stub tuner can match only a limited range of impedance and, at certain frequencies, is extremely difficult to use because of poor convergence and critical stub adjustments. This new tuner, known as a stub stretcher, performs the functions of a double stub tuner with none of its limitations.

The stub stretcher combines in a single unit an adjustable shorted stub (whose length is one-quarter wavelength) and a line stretcher. This combination permits the stub position to be continuously varied with respect to the load and thus, any load impedance can be matched to the line. The unit features a novel design with both the shorted stub and the line stretcher mounted within a single branch arm. All impedances can be matched quickly and with excellent convergence. Two models are available: one for use from 300 to 10,000 mc and the other from 1000 mc to 10,000 mc.

PRICE: $120.00 to $160.00
AVAILABILITY: From stock
MFR: Microlab, 570 West Mount Pleasant Ave., Dept EP, Livingston, New Jersey
SALES OFFICES: See **eem** p. 1636 (1960-61 Ed.)
OTHER PRODUCTS: See **eem** p. 1032

Check 79 Reader Service Card 6/60

PRINTED CIRCUIT BROADBAND COAXIAL MIXER [*Premier Instrument Corp.*]

Features Replaceable Printed Circuit Diode

A replaceable printed circuit diode is the feature of this new printed circuit broadband coaxial mixer. The Model PC-Mix is a compact, low noise figure mixer with local oscillator level adjustment. It is capable of withstanding severe vibration and shock and is available in frequency ranges of 250 mc to 8,000 mc in five basic units.

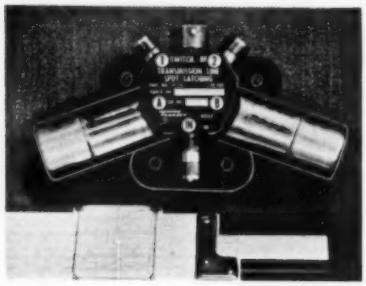
Some of the essential features are: a signal voltage standing wave ratio of 2:1 maximum; local oscillator voltage standing wave ratio of 1.5:1 maximum; a better than 9 db noise figure; and single or balancing mixing. Its approximate size is 4" by 3" by ¾", plus connectors and knobs.

Freq. Range (Mc)	Max. VSWR Signal	L.O.	Crystal
250-500	1.4	1.3	1N831A
500-1000	1.5	1.3	1N831A
1000-2000	1.8	1.4	1N831A
2000-4000	2.0	1.5	1N831A
4000-8000	2.2	1.7	1N832

PRICE: $350.00 each (Prototype), quantity discounts on request; **AVAILABILITY:** 6 weeks
MFR: Premier Instrument Corporation, New Broad Street, Dept EP, Port Chester, New York
SALES OFFICES: See **eem** p. 1664 (1960-61 Ed.)
OTHER PRODUCTS: See **eem** p. 1046

Check 80 Reader Service Card 6/60

COAXIAL LATCHING SWITCH [*Transco Products, Inc.*]



Solenoid Actuated — Requires No Holding Power

No holding power is required by this manufacturer's new solenoid actuated coaxial latching switch.

The newly designed solenoids operate from 28 volts, dc, and draw only 3.2 microamperes per hour. Switching time is 10 milliseconds. The 50-ohm switch is a make-before-break type. The switch weighs only 8.7 ounces. The frequency range extends to 11 kmc with typical specifications at 7 kmc of: Voltage Standing Wave Raito (VSWR), 1.4; insertion loss, 0.4 db; and crosstalk, 30 db.

Type N and TNC connectors are presently available—others can be supplied.

The radio frequency cavity design is the same as this manufacturer's Y-Type, which has been qualified for 2,000,000 operations. The same dependability is expected for this new solenoid actuated coaxial latching switch, designated as Part Number 21700 (connector must be designated separately).

PRICE: Contact Sales Offices below.
AVAILABILITY: 45-60 days
MFR: Transco Products, Inc., 12210 Nebraska Avenue, Dept EP, Los Angeles, California
SALES OFFICES: See **eem** p. 1704 (1960-61 Ed.)
OTHER PRODUCTS: See **eem** p. 1054

Check 81 Reader Service Card 6/60

Additional New MICROWAVE PRODUCTS

Ku-Band Fast Ferrite Switch enables two microwave antennas to be time-shared by a common transmitter and receiver, maintaining high isolation between the magnetron and load. Model R-107H claimed to be first fast-switch capable of handling peak power levels of 100 kw at 100 watt average in Ku Band; can be switched at speeds under 10 μsec. **PRICE:** Contact Sales Offices; **AVAILABILITY:** 45 days; **MFR:** Ferrotec, Inc., 217 California St., Dept EP, Newton, Mass. **SALES OFFICES:** See **eem** p. 1586

Check 164 Reader Service Card

X-Band Pulse Power Calibrator, Model PCX-9, for direct measurement of r-f peak pulse power with greater accuracy claimed than heretofore achieved by other than calorimetric means. Range 925-1225 mc; −10 to +63 dbm. For accurate calibration of attenuators, measuring insertion loss of cables, other r-f components. **PRICE:** $15,000.00; **AVAILABILITY:** 5 to 6 months; **MFR:** General Communication Co., 677 Beacon St., Dept EP, Boston, Mass. **SALES OFFICES:** See **eem** p. 1592

Check 165 Reader Service Card

Electrically Variable Attenuator, Model TFA-1, for the C-band, is a reciprocal ferrite device with large range of attenuation. Has an attenuation vs. solenoid current characteristic having a negative slope, and is essentially linear in db. Attenuation range exceeds 25db over minimum bandwidth of 15%. **PRICE:** Contact Sales Offices; **AVAILABILITY:** 30 days; **MFR:** Red Bank Div. Bendix Aviation Corp., Dept EP, Eatontown, N. J.; **SALES OFFICES:** See **eem** p. 1536

Check 166 Reader Service Card

Problems & Solutions

(Continued from page 19)

Series) have an operating temperature range from —20°C to 85°C, current ratings of 2 and 5 amps, and are available with voltage inputs of 6 to 250 volts, ac or dc. Timing accuracy of the units is maintained when subjected through a voltage variation of up to 30% of nominal input value.

E. J. Martin, Pres.
Marstan Electronics Corp.
Roosevelt, N. Y.

SOLUTION B: The A. W. Haydon Co., 240 N. Elm St., Waterbury, Conn., makes a relay as required. This series relay is continuously variable over wide ranges, has a ± 1% guaranteed accuracy, and meets military requirements. Their bulletin AWH-TD-500 gives details.

H. E. Seibert, Flight Test Grp. Eng.
Convair, San Diego, Calif.

(J. P. Cox, whose solution to #147 appears above, also suggested the A. W. Haydon Co. as a source for this relay. Ed.)

SOLUTION C: I suggest your reader see "Electrical Engineering" Feb. 1960. This relay can be built for less than $15 and it has everything desired by the inquirer.

I. M. Gurol
Maxitrol Co., Detroit, Mich.

(Problem 148)

MINIATURE DC-DC CONVERTER

We would like to launch some multiplier phototube detectors in high altitude rockets to obtain certain optical irradiance measurements. However, it has proved difficult to develop a high voltage supply which is small enough and yet has sufficient regulation to allow the desired accuracy of absolute measurements.

The miniature DC-DC converter should deliver 1000 vdc at a constant load of ½ ma with a regulation of at least 0.1% from an input of 28 ±5% vdc. The ripple must also be less than 0.1%. Batteries are not acceptable.

SOLUTION A: We have made numerous devices to do a job like this. Indeed, this is our business. Essentially it is a standard dc to dc converter with Zener diode stabilization.

H. Buchsbaum, Pres.
Bush Transformer Corp., Endicott, N. Y.

(Problem 150)

TEMPERATURE COMPENSATION OF DIELECTRIC CONSTANT

A crystal controlled oscillator has a plate circuit output through a very sensitive polarized relay. The drive of the oscillator circuit is controlled by an LC tank in the plate circuit, which is in turn dependent upon a reflected capacitance. The reflected capacitance is determined by the varying dielectric constant of a fluid stream. Temperature compensation of the fluid stream's dielectric constant is required in terms of current through the polarized relay. A 0.25 mmf increase in capacitance is required per 10°F temperature increase over a temperature span of 0 to 200°.

(Continued on page 25)

TECHNICAL LITERATURE

(Continued from page 21)

DC VOLTAGE MONITOR **Sec. 2900**

Preliminary Engineering Bulletin No. 60-119 discusses a miniature dc Voltage Monitor which has full-time, precision sensing with Go/No-Go output. Features of the units, general description, specs, etc. are covered. **Trio Laboratories,** Dept EP, Plainview, N. Y.

Check 128 Reader Service Card

DIGITAL MEASURING INSTRUMENTS **Sec. 2900**

20-page catalog on NLS Series 20 transistorized digital voltmeters, ratiometers, and ohmmeters includes wiring diagrams and application photos. First part of booklet covers major features of instruments and applications data; second provides more detailed data on operation, conversion to ac and low-level dc measurments, data logging accessories, specs, and diagrams for output-input connections and remote control. **Non-Linear Systems, Inc.,** Dept EP, Del Mar, Calif.

Check 130 Reader Service Card

MEMORY CORE TESTER **Sec. 2900**

Type 2101 Automatic Memory Core Tester, designed for production-line testing of ferrite magnetic memory cores is described in a 4-page folder. Unique decision-making logic and highly accurate core sensing system permit high-speed automatic testing of cores to all common quality control specs. **Digital Equipment Corp.,** Dept EP, Maynard, Mass.

Check 131 Reader Service Card

OSCILLOGRAPH BOOKLET **Sec. 3000**

This 36-page manual illustrates the versatility of the direct reading Visicorder oscillograph. Designed as a reference guide for engineers and scientists, includes detailed reports on applications in providing high frequency analog data in industry, missile component testing, advanced heart and lung studies, drone surveillance, engine testing, etc. Heiland Div., **Minneapolis-Honeywell,** 5200 E. Evans Ave., Dept EP, Denver, Colo.

Check 132 Reader Service Card

CARBON & GRAPHITE PRODUCTS **Sec. 3200**

8-page brochure includes detailed data on electrical, mechanical and chemical properties of carbon and graphite. Specific applications discussed include electronic power components, crucibles, molds, jigs, heaters, production applications, etc. Recommended techniques for machining carbon and graphite parts are outlined. Charts, graphs, dimensional diagrams and illustrations are included. **Speer Carbon Co.,** Dept EP, St. Marys, Pa.

Check 133 Reader Service Card

SULPHUR-COPPER ALLOY **Sec. 3200**

Handbook C-17 tells of a unique sulphur-copper alloy, called Amsulf, which gives the type of machinability usually associated only with brass, and at the same time retains the 96% IACS conductivity of pure copper. Amco Div. **American Metal Climax, Inc.,** 1270 Avenue of the Americas, Dept EP, New York 20, N. Y.

Check 134 Reader Service Card

MICROWAVE CATALOG **Sec. 3400**

Spiral bound, quick-reference 26-page Microwave Catalog covers product information on microwave switches, coax and waveguide, power dividers, directional couplers, multiplex antenna systems, etc. Special data section presents series of practical charts and graphs to aid microwave engineer. **Transco Products, Inc.** 12210 Nebraska Ave., Dept EP, Los Angeles 25, Calif.

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(Continued on page 27)

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1819 W. Grand Ave., Chicago 22, Ill.

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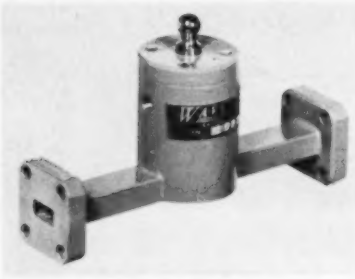
Ka BAND WAVEGUIDE SHORTING SWITCH [*Waveline, Inc.*]

eem File System electronic engineers master Sec. 3400



Operates Over Frequency Range of 26.5 to 40 KMC

The Model 1080 is a new Ka Band Waveguide Shorting Switch designed to operate over the frequency range of 26.5 to 40 KMC. This unit is a hand operated plunger type on-off switch that provides a convenient means of establishing a removable short circuit in waveguide transmission systems.

The device is ruggedly constructed of RG-96/U waveguide with UG-599/U cover flanges and employs a positive action switching plunger to assure efficient dependable performance. VSWR in the open position is 1.02 max. and in the closed or short position 125 min. Insertion loss in the open position is negligible. The unit has an overall insertion length of three inches and the maximum height from the centerline of the guide to the top of the plunger knob (in the withdrawn position) is 1½ inches.

In operation a tight fitting plunger assembly is introduced into the waveguide section effectively sealing off the transmission system. When fully withdrawn in the open position the continuity is retained and full operation with minimum loss is retained.

PRICE: $90.00 each **AVAILABILITY:** 4 weeks
MFR: Waveline, Inc., Dept EP, Caldwell, N. J.
SALES OFFICES: See **eem** p. 1717 (1960-61 Ed.)
OTHER PRODUCTS: See **eem** p. 1055

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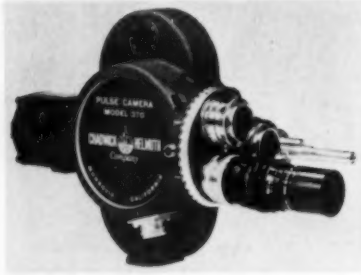
FAST PULSE CAMERA [*Chadwick-Helmuth Company*]

eem File System electronic engineers master Sec. 3800



Operates At High Rate Of Speed, 30 Frames Per Second

In production is a new improved Fast Pulse Camera, designated as Model 370, which can be operated at an exceptionally high rate of speed (30 frames per second maximum). The camera has a 1" f 1.9 lens as standard equipment.

The unit uses standard 100' rolls of 16 mm film. Versatility has been greatly increased by the addition of a shutter, enabling the unit to do all conventional pulse camera work. This camera is operated shutter-normally—closed for usual pulse photography and is ideally suited for time-lapse work. The device quickly changes to shutter-normally-open, for use with Slip-Sync slaved stroboscopic light systems.

Auxiliary Slip-Sync equipment permits slow motion movies (24 fps recommended) of cyclic events at speeds of 10,000 cps—an especial advantage in vibration test movies. Many scenes can be taken on one roll, and random events or failures are captured.

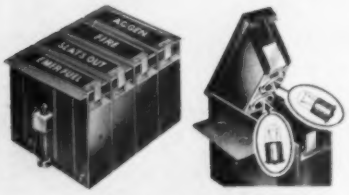
Power requirement is 110VAC, 60 cps. The lens mount is standard "C" three lens turret. Size of the camera is 8" x 5½" x 10" and weight is 7 pounds.

PRICE: $1,850.00 with lens; Slip-Sync Eqpt. Approx. $2,000.00; **AVAILABILITY:** 30 to 60 days
MFR: Chadwick-Helmuth Co., 472 East Duarte Rd., Dept EP, Monrovia, Calif.
SALES OFFICES: See **eem** p. 1549 (1960-61 Ed.)

Check 83 Reader Service Card 6/60

TWIN-LAMP PLACARD LIGHTS [*Dialight Corporation*]

eem File System electronic engineers master Sec. 3900



Illuminate Legends On Rectangular Legend Plates

A special feature of these Placard Lights is the method of replacing lamps: finger pressure on the release pin opens the top plate 110° for removal of lamps from the front of the panel.

Legends are inscribed on legend plates which act as the "lenses" of the Placard Lights. Made of translucent plastic, the plates provide a standard legend area and type sizes as follow: maximum legend area is 1⅛" x ⅝"; the type is 0.135" high for one row of characters (11 max.) and 0.115" high for two rows of characters (11 max.). Space permitting, characters up to 0.265" high can be supplied. Two types of legend plates are available: dual plates in which the top plate carries the legend and the underlying plate the color—red, green, or yellow (amber)—or, single plates in which no underlying color plate is used. Legends may be positive or negative style.

Each Placard Light houses two T-1¾ midget flange base incandescent bulb of 6, 14, or 28 volts as required.

PRICE & AVAILABILITY: Contact Sales Offices below
MFR: Dialight Corporation, 60 Stewart Avenue, Dept EP, Brooklyn, New York
SALES OFFICES: See **eem** p. 1566 (1960-61 Ed.)
OTHER PRODUCTS: See **eem** pp. 1085-1099

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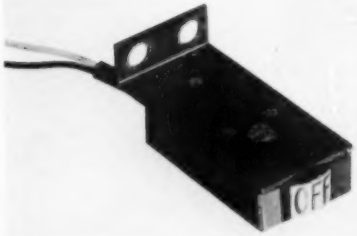
ELECTROMAGNETIC INDICATORS [*E. V. Naybor Laboratories, Inc.*]



Extremely High Dependability Under All Environmental Conditions

Extremely high dependability under all environmental conditions is the major feature of these small electromagnetic indicators.

Operation is accomplished in a new magnetic circuit which surrounds a permanent magnet rotor. Energization of a dual coil electromagnet causes rotation of the permanent magnet rotor, thus changing the position of the dial. Upon removal of coil voltage, the dial returns to the OFF position.

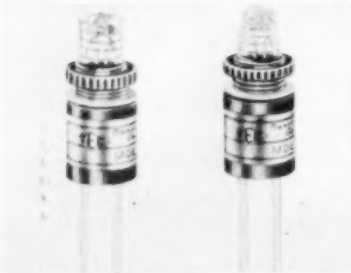
The case of the unit is made of aluminum and is anodized black. All materials used are protected against corrosion by suitable finishes and the indicator is manufactured in accordance with specification MIL-E-5272.

The specifications of the unit are as follow: coil, standard coil resistance for 26.5 vdc operation, 450 ±10%, ohms; temperature range, —55°C to 125°C; vibration, 10g's to 1kc; shock, 50g's for 10 ±1 millisecond; operating time, 0.05 second; weight, 0.3 ounce.

PRICE: Contact Sales Offices below
AVAILABILITY: 4 to 6 weeks
MFR: E. V. Naybor Laboratories, Inc., 26 Manorhaven Boulevard, Dept EP, Port Washington, New York
SALES OFFICES: See **eem** p. 1647 (1960-61 Ed.)
OTHER PRODUCTS: See **eem** p. 1248

Check 85 Reader Service Card 6/60

INDICATORS WITH WIRE WRAP TERMINALS [*Transistor Electronics Corporation*]



Claimed Time Saver For Those Utilizing Wire Wrap Techniques

These new Indicators with wire wrap terminals are believed to be the first such units offered.

These terminals, which are built to industry standards, are expected to be real time and cost savers for those equipment manufacturers who take advantage of wire wrap techniques.

The terminals are available on all of this concern's neon or incandescent indicators with either permanent or replaceable lamps, standard or transistor driven.

These units are offered at no increase in price over the standard solder or taper pin terminals, the maker says.

Indicators are available with ½ watt series resistors if required. Potting is also available on special order.

Operational and storage temperature is —40°C to 65°C at 95% humidity maximum.

PRICE: $1.80 each (1-9), $1.45 each (10-24), $1.15 each (25-99), $0.90 each (100-499), $0.75 each (500 up); **AVAILABILITY:** 10 days
MFR: Transistor Electronics Corp., 3357 Republic Ave., Dept EP, Minneapolis 26, Minn.
SALES OFFICES: See **eem** p. 1705 (1960-61 Ed.)

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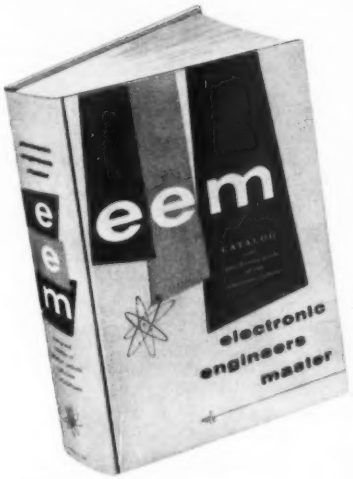

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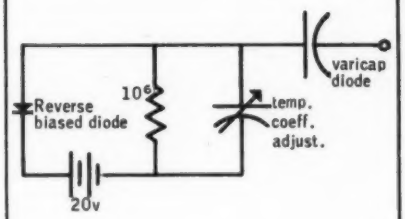
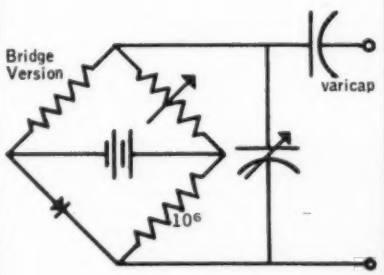
Problems & Solutions

(Continued from page 23)

SOLUTION A: The problem can be solved easily by inserting a glass enclosed reverse biased germanium diode in the fluid stream. In the following circuit the diode will cause the voltage E to double every 10°C which can be used to control the capacitance of a voltage variable semiconductor diode. A bridge circuit can be employed if the capacitance is required to decrease with temperature.

L. C. Cowles
Geophysical Lab., Superior Oil Co.
Bellaire, Texas





(Problem 151)

BUTTERFLY TYPE CAPACITORS

I am trying to find the manufacturer of Butterfly type capacitors. This is not the "Butterfly" capacitor that is commonly listed in the catalogs but a true Butterfly inductance-capacitance tuner as used in UHF oscillator circuits.

SOLUTION A: Hershel Radio Co., 5249 Grand River Ave., Detroit, Mich. advertises four different butterfly tuning units. These are not what are commonly listed as "Butterfly Capacitors" but are indeed the units your reader requires.

General Radio Co., West Concord, Mass., uses a butterfly tuning unit in one of their wave meters, and he may be able to obtain information on the manufacturer from them.

G. P. Anderson
Metals Research Lab.
Richardson Hall, Brown Univ. Providence, R.I.

(Both L. C. Cowles (whose solution to Problem 150 appears above), and J. Baer, of Ascop Div. of Electro-Mechanical Research, Inc., of Princeton, N. J., also suggest the General Radio Co. of West Concord, Mass. as a source for these capacitors. Ed.)

DEE PRINTED CIRCUIT SOLDER POTS

Proven design with precise controls. Mechanical type dial thermometers to indicate solder temperature. Hydraulic thermostats. Walls and bottom of the solder cavities are smooth and free of all obstructions.

Temperatures range 300° to 600° F. Temperature swing ±2°. Wide variety of sizes up to eight feet long. All voltages.

Send for bulletin.

DEE ELECTRIC COMPANY
1105 N. PAULINA STREET
CHICAGO 22, ILLINOIS

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MEMBER PACE

AMERICAN ELITE, INC.
48-50 34th Street Long Island City, N.Y. Dept. R

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TRANSISTORIZED POWER SUPPLY [*Del Electronics Corp.*]

Well Regulated DC At High Current—10-32V DC At 0 To 15 A

This new Transistorized Power Supply, Type SCRT 32-15-1, uses solid state switches. The unit was designed to supply well regulated DC at high current. The supply has an output of 10-32V DC at 0 to 15 A (both sides floating with respect to ground).

Silicon controlled rectifiers provide the basic regulation for line and load while transistors provide the transient suppression and dynamic filtering. The unit enjoys both the advantages of firing angle control for minimum dissipation and transistor control for fast transient response and ripple reduction.

Dynamic response is less than 100MV transient spike for 100 microseconds for ±2% ampere step change in load current and less than +1V transient spike for .1 millisecond for step load change from 15 A to 0 A. Ripple is less than 1MV rms.

Features include internal and remote sensing, floating output, front and back output terminals and totally enclosed chassis. Other models at higher and lower voltages and with tighter regulation are available.

PRICE: $650.00; **AVAILABILITY:** 4 weeks
MFR: Del Electronics Corp., 521 Homestead Ave., Dept EP, Mt. Vernon, New York
SALES OFFICES: See **eem** p. 1564 (1960-61 Ed.)
OTHER PRODUCTS: See **eem** p. 1121

Check 87 Reader Service Card 6/60

VOLTAGE REGULATED D-C POWER SUPPLY [*Kepco, Inc.*]

Transistored Unit Delivers 0-36 Volts DC, 0-15 Amperes

This unit is the first in this manufacturer's new line of transistorized voltage regulated d-c power supplies which extends the power capability of semiconductor circuitry to levels formerly handled only by vacuum tube and magnetic designs.

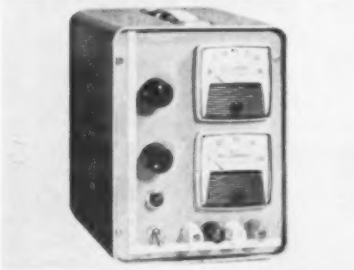
The power supply features: wide power range; transistor regulation (no magnetic amplifiers, no vacuum tubes); and continuously variable output voltage control. An inherent overload protection automatically reduces dissipation requirements of pass elements during heavy load demands or short circuit. A thermostat relay control shuts off the unit automatically if the temperature exceeds 50°C. Remote error sensing terminals provide the means for maintaining the specified regulation directly at the load.

Regulation for line or load is 0.1% or 3 millivolts, whichever is greater. Regulation of 0.01% may be obtained on special order. Ripple is less than 1 mv rms. Output impedance is 0.005 ohms from dc to 1 kc and 0.05 ohms from 1 kc to 100 kc.

PRICE: $825.00; **AVAILABILITY:** 60 days
MFR: Kepco, Inc., 131-38 Sanford Avenue, Dept EP, Flushing, New York
SALES OFFICES: See **eem** p. 1621 (1960-61 Ed.)
OTHER PRODUCTS: See **eem** pp. 1147-1153

Check 88 Reader Service Card 6/60

PORTABLE TRANSISTORIZED POWER SUPPLY [*Mid-Eastern Electronics, Inc.*]



Use As Component Of Automatic Systems For Remote Programming

Designed for bench use and as a component of automatic systems for remote programming, a new Miniature Portable Transistorized Power Supply, designated as Model MP40, has been added to this manufacturer's line.

The units overload protection is completely electronic, and the transistors and other components in the load circuit are protected against damage by a continuously variable electronic current limiting circuit.

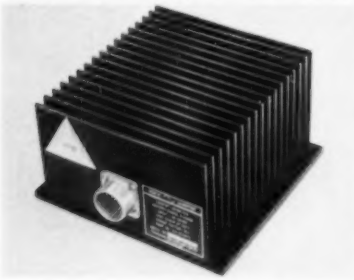
Specifications include: output 0 to 40 V dc at 0 to 200 ma; load regulation 0.05% for 0 to full load changes; ripple less than 500 microvolts; voltmeter and milliammeter are standard; 6-inch width permits several units to be placed side-by-side on a shelf or bench; absolutely silent operation; constant current operation.

The unit is programmable from a distant point at 500 ohms per volt. Dimensions are 6 x 8 x 8 inches.

PRICE: $159.00 each (quantity discounts apply)
AVAILABILITY: From stock
MFR: Mid-Eastern Electronics, Inc., 32 Commerce St., Dept EP, Springfield, N. J.
SALES OFFICES: See **eem** p. 1637 (1960-61 Ed.)
OTHER PRODUCTS: See **eem** p. 1163

Check 89 Reader Service Card 6/60

SYNCHRONOUS-SWITCHING STATIC INVERTER [*Thompson Ramo Wooldridge Inc.*]



Converts 24-28 VDC To 110V, Three Phase, 400 CPS

This unique Synchronous Switching Static Inverter converts 24 to 28 vdc to 110 volt, three-phase, 400 cps. The static inverter is designed to combine the square-wave output of a number of semi-conductors to produce a stepped-wave which closely approximates the characteristics of a sine-wave inverter. The total harmonic distortion of the resultant waveform is about 19%. A constant output voltage is maintained by means of a precise and stable voltage reference.

Performance characteristics are well within the following specifications: frequency control, 0.002%; three-phase output regulation, ±0.3%; output short circuit protection; input voltage regulation; transient protection; efficiency, 85% to 90%; goal, 50 watts per pound and 3.5 watts per cubic inch; and temperature tolerance, 100 degrees C.

The method of synchronous-switching may be applied to an inverter of any volt-ampere rating, the maximum rating depending solely on the thermal limitations imposed by the environment and the state of the art in solid state switching devices.

PRICE & AVAILABILITY: Contact Sales Offices below
MFR: Thompson Ramo Wooldridge Inc., Tapco Group, 23555 Euclid Avenue, Dept EP, Cleveland, Ohio
SALES OFFICES: See **eem** p. 1702 (1960-61 Ed.)

Check 90 Reader Service Card 6/60

Additional New POWER SUPPLY PRODUCTS

Transistorized DC Power Supplies with an exceptionally high power-to-volume ratio, within a panel height of 3½", deignated as Series QR. Typical unit is Model QR-36-4 having output of 0-36 volts and 0-4 amps which may be employed as either positive or negative output, may be floated up to 500V above or below ground. **PRICE** $485.00; **AVAILABILITY:** Stock to 4 weeks; **MFR:** NJE Corporation, 20 Boright Ave., Dept EP, Kenilworth, N. J.: **SALES OFFICES:** See **eem** p. 1644

Check 168 Reader Service Card

Regulated Power Supply contains a reactor and a hermetically sealed constant voltage transformer. Tubeless power supply features time delay relay adjustable from 30 seconds to 3 minutes to allow for warm-up. Output 155 VDC @ 150 ma regulated to ±1%. **PRICE:** $85.00; **AVAILABILITY:** 1-2 weeks; **MFR:** Freed Transformer Co. Inc., 1718 Weirfield St., Dept EP, Brooklyn 27, N. Y.; **SALES OFFICES:** See **eem** p. 1590

Check 169 Reader Service Card

Transistorized Lab Power Supply, Model 3225 features automatic current limiting and precision voltage regulation. Output voltage may be adjusted through absolute zero. Output 0-32 VDC, 0-250 ma, maximum 350 ma. **PRICE:** $198.00; **AVAILABILITY:** Stock; **MFR:** Power Instruments Corp., 235 Oregon St., Dept EP, El Segundo, Calif.

Check 170 Reader Service Card

Portable 35KV DC Power Supply, Model PSC 30-5-1 furnishes 35KV @ 1 ma, 30KV @ 5 ma. Has no exposed HV components, continuously adjustable from 5% to 115% overvoltage and overcurrent relays. **PRICE:** $595.00; **AVAILABILITY:** Stock; **MFR.** Del Electronics Corp., 521 Homestead Ave., Dept EP, Mt. Vernon, N. Y.; **SALES OFFICES:** See **eem** p. 1564

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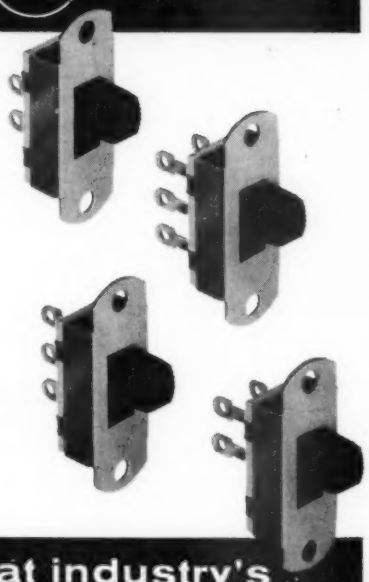

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Now UID precision has been able to develop the finest quality slide switches at lowest possible cost! Available for 1 amp AC and 3 amp AC as well as standard DC operation, these new switches will satisfy your requirements efficiently and economically. Send for complete specifications and name of UID representative in your area.

UID UNITED INTERNATIONAL DYNAMICS CORPORATION

SALES: 373 LONG BEACH ROAD, OCEANSIDE, N. Y.
PLANT: 243 LEXINGTON STREET, WALTHAM, MASS.

Please send me specs on UID slide switches.

Name_____

Firm_____

Address_____

City_____ State_____

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TECHNICAL LITERATURE

(Continued from page 23)

WAVEGUIDE SEAL CHART **Sec. 3400**

Wall size waveguide conversion chart for flange seals shows all wave band series and various seals produced by maker to fit standard flanges. Also includes dimensions and other pertinent data for checking materials, sizes, etc. **Parker Seal Co.**, 10567 Jefferson Blvd., Dept EP, Culver City, Calif.

Check 136 Reader Service Card

STANDING WAVE AMPLIFIER **Sec. 3400**

Bulletin PRD 277-B describes a specially designed high gain audio amplifier to be used with slotted sections in making standing wave measurements. Lists special features and details performance characteristics such as frequency, sensitivity, noise level, bandwidth, attenuation range and power. **PRD Electronics Inc.**, 202 Tillary St., Dept EP, Brooklyn 1, N. Y.

Check 138 Reader Service Card

MICROWAVE RECEIVER FRONT ENDS **Sec. 3400**

Catalog No. 60 provides 32 pages of information on microwave receiver front ends including data on a number of waveguide and coaxial mixer-preamplifier assemblies. Also describes solid-state, miniature and subminiature i-f amplifiers, TWT amplifiers, octave r-f amplifiers, beacons and afc units. **LEL, Inc.**, 380 Oak St., Dept EP, Copiague, N. Y.

Check 139 Reader Service Card

STEPPING MOTOR **Sec. 3500**

Completely illustrated 4-page brochure (Bulletin G-360-1) describes a new Digimotor, compact stepping motor and indexing device. Full data on reliability, high-torque-to-size ratio, complete torque chart, etc. **Ledex, Inc.**, Dept EP, Dayton, Ohio

Check 137 Reader Service Card

DOSIMETERS & SURVEY METERS **Sec. 3600**

12-page brochure (Form 3115-9) entitled "Victoreen Personal and Area Dosimeters, Portable Survey Meters and Probes" covers in all 15 separate instruments, not including a wide variety of stray-radiation chambers and scintillation probes. In addition to descriptive data, the booklet also gives detailed specifications and performance curves. **The Victoreen Inst. Co.**, 5806 Hough Ave., Dept EP, Cleveland 3, Ohio

Check 140 Reader Service Card

HANDBOOK OF PILOT LIGHTS **Sec. 3900**

This comprehensive 256-page "Dialco Handbook of Pilot Lights" is the result of many years of intensive research and should fill a special and long-felt need in industry. Handsomely bound, hard cover, 8½" x 11" in size, the basic theme of this manual is to answer the problem of selecting the proper pilot light to accommodate the required lamp. Handbook Application Form available from **Dialight Corp.**, 60 Stewart Ave., Dept EP, Brooklyn 37, N. Y.

Check 141 Reader Service Card

VARIABLE VOLTAGE ADJUSTORS **Sec. 4000**

Covering in detail the subject of voltage variations and fluctuations, this new catalog also includes examples of over-voltage and under-voltage effect on the performance of electronic equipment, lighting, motorized equipment and heating appliances. Also contains complete specs of manual voltage adjustors in capacities from 150 watts to 10 KVA in primary ranges of 65 to 145 volts, 145 to 240 volts, secondary voltages 115 and 230 respectively. **Acme Electric Corp.**, Dept EP, Cuba, N. Y.

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(Continued on page 31)

C E C

Magnetostrictive delay lines by C.E.C. are built to give a fixed delay time, can be tapped to give a series of delay times, or can be made as continuously variable delay lines. This versatility makes the magnetostrictive delay line a highly useful device in any system that uses dc pulses.

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DELAY LINES

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Range 2-10,000 μSec.

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Delay:
2 to 500 μSecs.
Size: 4" x 4" x 4"

Model VM-1020
Delay: 2 to 20 μSecs.
Size: 5/8" h. x 7/16" w. x 7" L.

Model FM-1050
Delay: 6,000 μSecs.
Size: 12" x 12" x 0.5"

Numerous versions of the above models as well as a capability to meet all specifications enables C.E.C. to consistently supply the needs of industry. Our engineering staff is always at your service. Write today for complete literature on our product line.

CONTROL ELECTRONICS CO., INC.
Ten Stepar Place, Huntington Station, N.Y.

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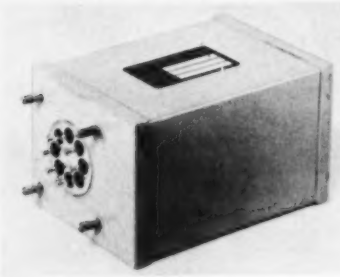
MAGNETIC VOLTAGE REGULATOR [*Voi-Shan Electronics*]

eem File System | Sec. 4000

Provides Highly Regulated Voltage Output For Airborne, Ground Use



Model RT-1058 is a new Magnetic Voltage Regulator providing a highly regulated voltage output for airborne and ground applications. The unit operates over a temperature range of –65 to 125°C.

The input voltage range is 115 VAC or 28 VDC, with frequencies of 60, 360 or 1000 cps. This unit's output voltage is 5 to 400 volts AC with regulation held to ±1% during input and load variations of 50 to 100%.

The device consists of a balanced bridge sensor assembly which senses the output voltage of a transformer. When this output voltage changes due to varying load conditions, input voltage, or frequency variations, an error signal is produced in the balanced bridge circuit. This error signal is applied to the magnetic element regulator, increasing or reducing the primary voltage of the transformer.

Power handling is from 5 to 500 VA, with shock, vibration and altitude conforming to MIL-T-5422C. Physical size, weight, and shape of the unit are held to a minimum through use of high efficiency magnetic cores and advanced packing techniques.

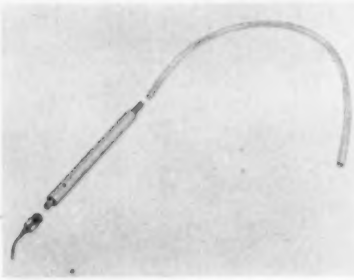
PRICE: Contact Sales Offices below
AVAILABILITY: 4 to 6 weeks
MFR: Voi-Shan Electronics, 13259 Sherman Way, Dept EP, North Hollywood, Calif.
SALES OFFICES: See **eem** p. 1715 (1960-61 Ed.)

Check 91 Reader Service Card 6/60

INDUSTRIAL PICKUP HANDLING DEVICE [*Penfield Manufacturing Co.*]

eem File System | Sec. 4100

Eductor Tube Aids Handling Minute Parts, Germanium, Silicon Crystals



Minute parts (such as germanium and silicon crystals) used in the manufacture of semiconductors and other electronic assemblies can be handled easily by this new device.

Called the Pickup, the newly developed pencil-shaped device obviates the need for costly and troublesome vacuum equipment, operating instead on direct pressure. Either air or inert nitrogen is forced through a specially channeled and orificed eductor tube at 1-2 psi. Sufficient negative pressure to attract and hold a desired particle is developed at the pick-up point—the unsharpened end of a standard hypodermic needle which can vary in diameter to accommodate particles of differing sizes.

To release the held article, the operator merely finger-stops an orifice on the face of the Pickup, thereby creating positive or repelling pressure. The use of this Pickup eliminates foot switches, solenoids, and all other complicated vacuum equipment, making the handling of miniscule parts as simple as writing with a pencil, maker states.

PRICE: $10.00 to $15.00; **AVAILABILITY:** From stock
MFR: Penfield Manufacturing Co., 19 High School Avenue, Dept EP, Meriden, Conn.
SALES OFFICES: See **eem** p. 1656 (1960-61 Ed.)

Check 92 Reader Service Card 6/60

BASICS OF INDUCTION HEATING [*John F. Rider Publisher, Inc.*]

eem File System | Sec. 4200

For Students, Industrial Training Courses And Shop Men

Basics Of Induction Heating, by Chester A. Tudbury, is a new visual presentation of the fundamental principles of the induction heating art, and of commercial induction heating equipment.

Intended for students, technical institutes, and industrial training courses, this text is useful for shop men engaged in operating, maintaining and tooling induction heating equipment. The book explains what induction heating is, how it works and describes the more common types of industrial machines in use today.

It presents material to assist in developing a quantitative understanding for new applications, and it deals with electrical and thermal aspects in detail. In addition it touches more briefly upon some of the mechanical problems associated with fixturing.

Graduate engineers who have not had the opportunity of devoting time to this subject will also benefit greatly from this book.

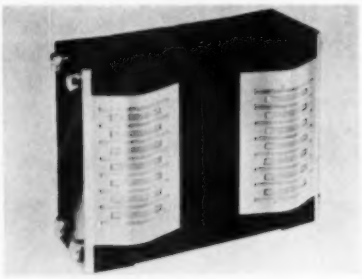
PRICE: $7.80 (#247, 2 Vol. Set, Soft Cover)
$3.90 (#247-1 Vol. 1, #247-2 Vol. 2, Soft Cover)
$8.90 (#247-H Cloth Cover)
AVAILABILITY: From Publisher, Jobbers, Bookstores
MFR: John F. Rider Publisher, Inc., 116 W. 14th St., Dept EP, New York, N. Y.
SALES OFFICES: See **eem.** p. 1674 (1960-61 Ed.)
OTHER PRODUCTS: p. 1204

Check 93 Reader Service Card 6/60

INTEGRAL INTERLACE MAGNETIC HEADS [*Clevite Electronic Components Div. of Clevite*]

eem File System | Sec. 4300

For Analog, Digital Recording—Provides More Efficient Use Of Tape



Designated as Series 2000, these new Integral Interlace Magnetic Heads for analog and digital recording provide more efficient use of tape and maintain critical relative azimuth and spacing between two gap lines.

The interlace feature of these heads nearly doubles the number of channels which can be recorded on a given tape width. A higher signal-to-noise ratio is also attained. The Gap-Mounted® principle assures parallelism and exact spacing between gaps.

The heads meet the mechanical design standards of the Inter Range Instrumentation Group for missile telemetry. Optional electrical characteristics are available for record, playback, and combination record/playback requirements. Both high and low impedance heads are offered for use with vacuum tube or transistor drivers and amplifiers. The series is available in 6 tape formats, compatible with most computer and instrumentation recorder equipment. Double head assemblies for redundant analog recording are also available.

PRICE: $40.00 per channel; **AVAILABILITY:** 8 weeks
MFR: Clevite Electronic Components Div. of Clevite Corp., 3405 Perkins Ave., Dept EP, Cleveland 14, Ohio
SALES OFFICES: See **eem** p. 1553 (1960-61 Ed.)

Check 94 Reader Service Card 6/60

LOW CURRENT SILICON CONTROLLED RECTIFIERS [*G. E. Co., Semiconductor Prod.*]

eem File System | Sec. 4400

For Pulse, Phase Controlling D-C Output—Power Inversion

Application of these new Low Current Silicon Controlled Rectifiers are expected in circuits for pulse and phase controlling D-C output as well as power inversion. Eight models are available. They differ by repetitive peak inverse voltage ratings, which range from 25V for the C10U to 400 volts for the C10D.

The devices have also been characterized with transient peak inverse voltage ratings so that they may be designed into circuits with non-recurrent voltages exceeding the maximum repetitive PIV ratings but of less than 5-milliseconds duration. The unit also features a glass-top design especially engineered for a long creepage path.

Average forward current ratings are 1.7 amps at a stud temperature of 125°C and 4.2 amps at a 75°C stud temperature. The maximum reverse or forward leakage current, full cycle average, at 150°C of the 200V device is 3ma. The rectifiers are capable of handling peak surge currents of 125 amps during the turn-on time interval. The one cycle surge current rating of all the units is 60 amps at rated load.

PRICE: $4.50 (25V Model), $10.00 (200V Model), $40.00 (400V Model); **AVAILABILITY:** From stock
MFR: General Electric Co., Semiconductor Prod. Dept., Dept EP, Syracuse, N. Y.
SALES OFFICES: See **eem** p. 1594 (1960-61 Ed.)
OTHER PRODUCTS: See **eem** pp. 1218, 1219, 1314

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"A Place for Everything . . ."

If there's one characteristic that engineers have in common, it is their penchant for orderliness and organization. We don't know whether the old saying, "A place for everything, and everything in its place," was first expressed by an engineer, but it may very well have been.

Since ELECTRONIC PRODUCTS Magazine is intended for the electronics engineer, and those associated with him, we strive constantly to aid in this endeavor by logical organization of our published material. We present to you each month information on the newest products in the industry, with all related items grouped together. This helps you locate quickly those items of most interest to you, and eliminates the time-consuming distraction of unrelated reading matter.

As an extra "bonus" this information is ready for filing. The articles on new products bear the **eem** File System number for simplicity in filing and retrieval.

Where more than one new product article appears in a given section, the **eem** File System number will be found only on the first such item on the page. This permits filing the entire page, or pertinent sections of it, with ease.

For quicker identification of all new product articles in the same section we are now using a broken line in color, between sections.

With the many **eem** File Systems now in use (over 6,000 at the last count) we feel that these new aids to identification will be welcomed. For identification of **eem** File System numbers and the broad product categories they represent, please see page 552 in your new edition of **eem** (1960-61).

Your comments on this, or other methods for making ELECTRONIC PRODUCTS Magazine of greater value to you, will be most gratefully received.

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- A catalog on the complete line of products.
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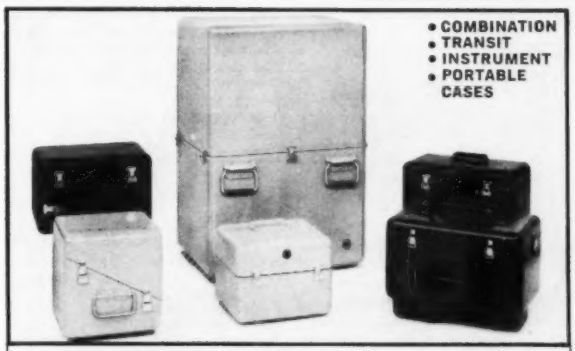

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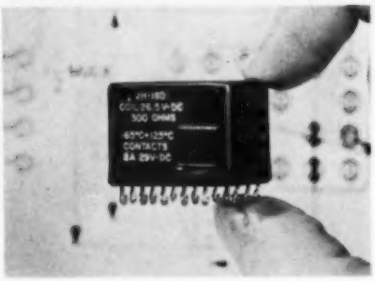
New Products of the Month

SIX POLE DOUBLE THROW SUBMINIATURE RELAY [*Allied Control Co., Inc.*]

eem File System Sec. 4500



Specifically Designed With 0.2 Inch Grid Spacing

This unique new Six Pole Double Throw Subminiature Relay, said to be the first, specifically designed with 0.2 inch grid spacing occupies less than a cubic inch of space and weighs not over 1.8 ounces. Designated as type JH-18D this highly stable, hermetically sealed military type d-c relay withstands shocks of 50g and vibration of 28-2000 cps at a constant 20g and 5-28 cps at 0.5 inch double amplitude without malfunction.

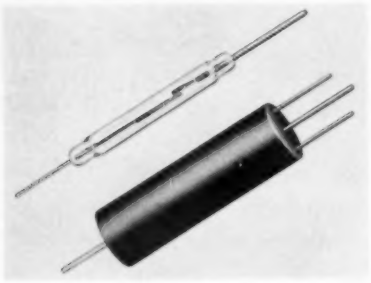
Standard coils include nominal voltage ratings from 6 to 115 volts dc with a power rating of approximately 2.5 watts. Also standard are coils for plate circuit use with a pull-in as low as 7.5 milliamps with a resistance of 11,570 ohms.

The unit has a constant rating of 2 amperes non-inductive or 1 ampere inductive at 29 volts dc or 115 volts ac. The ambient temperature range is from –65°C to 125°C. Plug-in, printed circuit or hook type solder terminals are provided with 0.2" grid spacing. Operate time is 8 milliseconds or less, at nominal voltage at 25°C. Release time is 5 milliseconds or less at nominal voltage at 25°C.

PRICE: $30.00; **AVAILABILITY:** 6 to 8 weeks
MFR: Allied Control Co., Inc., 2 East End Ave., Dept EP, New York, N. Y.
SALES OFFICES: See **eem** p. 1520 (1960-61 Ed.)
OTHER PRODUCTS: See **eem** p. 1229

Check 96 Reader Service Card 6/60

REED RELAYS [*Struthers-Dunn, Inc.*]



Provide High Operating Speeds With Minimum Contact Bounce

Based on an unusual design incorporating a short pole piece with a longer moving reed, these new Reed Relays permit higher operating speeds with conventional reed switches. The relays provide improved dependability and performance for computers, data processing equipment, transistor drive and other applications.

A hermetically sealed, glass encapsulated magnetic reed switch is surrounded by an operating coil to provide SP-ST normally-open relay action. It is suited for low level switching or for low power switching of loads up to 15 watts and 250 volts.

The switch itself is 3¼" long by .215" in diameter. A single contact relay with coil as illustrated is approximately 7/16" in diameter.

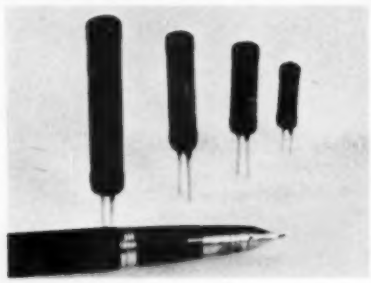
Other limits can be furnished with other types of packaging including assemblies of several switches surrounded by a single operating coil to provide multipoles and clusters of relays on printed circuit boards.

PRICE: $2.00 to $20.00 depending on requirements
AVAILABILITY: Approximately 4 weeks
MFR: Struthers-Dunn, Inc., Dept EP, Pitman, N. J.
SALES OFFICES: See **eem** p. 1693 (1960-61 Ed.)

Check 97 Reader Service Card 6/60

BASE MOUNTED WIRE WOUND RESISTORS [*Dale Products, Inc.*]

eem File System Sec. 4700



Ideally Suited For Printed Circuits

These new miniature, precision, Base Mounted Wire Wound Resistors with two parallel leads, designated Type PRS, need only an area equal to their circumference for mounting purposes. These new resistors, especially designed to meet power requirements in printed circuits where space is at a premium, offer ideal solution to miniaturization design problems.

The units offer all the advantages and features of the maker's standard Type RS resistors. Their outstanding silicon coating maintains stable performance under adverse environmental conditions, maker states.

These resistors are available in 4 wattages, 3, 5, 7 and 10, and in 5 sizes ranging from 5/16 x 3/4 to 1 13/32 x 3/8. Tolerance range is 0.05%, 0.1%, 0.25%, 0.5%, 1% and 3%. Resistance range is from .05 ohm to 175K ohms.

The PRS-2 provides 100% power up to 100°C and derates to 0 at 275°C. The other four sizes provide 100% power to 25°C and derate to 0 at 275°C. Temperature coefficient is 0.00002/°C and dielectric strength is 1000 VAC—V block test.

PRICE: Contact Sales Offices below; **AVAILABILITY:** 3 weeks
MFR: Dale Products, Inc., Box 136, Dept EP, Columbus, Nebraska
SALES OFFICES: See **eem** p. 1562 (1960-61 Ed.)
OTHER PRODUCTS: See **eem** pp. 989, 1266

Check 98 Reader Service Card 6/60

Additional New POTENTIOMETER PRODUCTS

Carbon Element Trimmer Potentiometer, Series 140, has stable carbon element of same type used in MIL-R-94, unique contact mechanism with long spring arms for adequate spring range in limited space, and 25-turn lead screw with clutch stops. 0.2 watt power rating at 70°C, 125°C maximum. Range 500 ohms to 1 meg (linear taper). **PRICE:** Varies with quantity; **AVAILABILITY:** 3 to 5 weeks; **MFR:** CTS Corp. (formerly Chicago Telephone Supply), Dept EP, Elkhart, Ind.; **SALES OFFICES:** See **eem** p. 1551

Check 172 Reader Service Card

High Reliability Trimmer Potentiometer, Type 118. Six new miniature models available in 8 standard resistance values from 100 to 25,000 ohms. All values made with 22 ppm resistance wire, can dissipate 1 watt at 125°C (derated to 0 watts at 150°C) for at least 2,000 hours. Meet MIL-STD-202A and NAS710. **PRICE:** $15.00 to $25.00; **AVAILABILITY:** Stock to 4 weeks; **MFR:** Carter Mfg. Corp., 23 Washington St., Dept EP, Hudson, Mass.; **SALES OFFICES:** See **eem** p. 1548

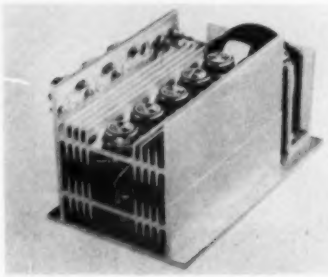
Check 173 Reader Service Card

Panel Mounting Subminiature Trimmer Potentiometer, Model 510, designated as "Wee-50" is ½" diameter, high temperature unit, weighs less than 6 grams. Operates in –55°C to 200°C temperatures, withstands shock to 20 G's, meets MIL-E-5272A and other specs. **PRICE:** Contact Manufacturer; **AVAILABILITY:** 2 weeks; **MFR:** Handley, Inc., 12960 Panama St., Dept EP, Los Angeles, Calif.

Check 174 Reader Service Card

HEAT SINK/DISSIPATOR [*The Delbert Blinn Co.*]

eem File System Sec. 4800



Dissipates Hundreds Of Watts With Temperature Rise Of A Few Degrees

Using forced convection these heat sink/dissipators dissipate hundreds of watts of power with temperature rises of a few degrees, or a few watts of power with natural convection.

The side flanges have been designed so that various stages, rectifiers, and/or other such components may be mounted thereon. The side flanges may be narrowed or cut off if desired.

With a 6¾ inch long stacked structure (illustrated) the following data was taken with a 120 cfm (0 pressure) blower supplying air: watts dissipated, 200; temperature rise, 12°C; and calculated thermal resistance, 0.06°C per watt. The temperature was measured on the extrusion center web —the hottest part of the structure.

By properly cutting off the side flanges, three lengths may be stacked and with the same air flow and temperature rise more power dissipated. A single section eight inches long will provide the following results: air flow, 120 cfm; power dissipated, 125 watts; and hot spot temperature rise, approximately, 10°C.

PRICE: $10.00 per ft.; **AVAILABILITY:** From stock
MFR: The Delbert Blinn Co., P.O. Box 757, Dept EP, Pomona, California
SALES OFFICES: See **eem** p. 1538 (1960-61 Ed.)

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$99.95 PATS. PEND.

Not Pint Size

Full ½ gal. capacity
Powerful 40 watt output
Stainless steel tank

We will pay all shipping charges to any point within the U.S. (except Alaska and Hawaii) if you enclose check with order.

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ULTRASONIC CLEANER

The lowest priced ultrasonic cleaner ever sold!

Buy ONE or 100 and Save!
Low Prices On Larger Models

Simplified one knob control for easy operation. High Frequency sound waves disintegrate harmful soils and contaminants in seconds. Saves time and labor, boosts production rate, improves product. You can replace hazardous chemicals with safe solvents and even water.

5-DAY TRIAL

Choice of 7 beautiful decorator colors to harmonize with your office or laboratory decor: Ivory, Wheat yellow, Turquoise, Desert sand, Pale green, Soft gray and Coral pink. Please specify color when ordering.

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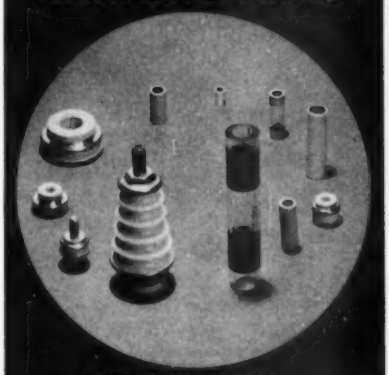
FOR GUARANTEED HERMETIC SEALS



METALIZED CERAMICS

- Both steatite and alumina ceramic housings are available, metalized to permit you to hermetically seal your assembly by either brazing or soldering.
- Ask for Bulletin M-100 or send prints for quotation. Write, wire or call for free engineering consultation on your metalized ceramic requirements.

METALIZING INDUSTRIES, INC.
338 Hudson Street • Hackensack, N. J.
HUbbard 9-7433

Check 28 Reader Service Card

TECHNICAL LITERATURE

(Continued from page 27)

D-C POWER SUPPLIES Sec. 4000

Bulletin B60-1 is a 4-page catalog giving complete information on a new line of fixed voltage transistorized regulated d-c power supplies with 6, 12, 28 and 50 volts nominal output voltages at currents from 1 to 25 amperes. **Universal Electronics Co.**, 1720 22nd St., Dept EP, Santa Monica, Calif.

Check 144 Reader Service Card

AUTOMATIC CIRCUIT BOARD PRINTER Sec. 4100

A precision automatic screen printer for high speed production of printed circuit boards is described in a 6-page, fully detailed, illustrated bulletin which outlines set-up, automatic cycling and operating procedures, provides specs and tolerances, includes recommendation for application of production line techniques now made practical for total circuit board production. **Wyrco Projects Inc.**, 66 Main St., Dept EP, Binghamton, N. Y.

Check 145 Reader Service Card

INDUCTION HEATING TURNTABLE Sec. 4100

Brochure describes Vari-Matic turntable, a continuously moving, variable speed device for an automated method to be used in conjunction with induction heating. Eliminates costly wait for indexing and elevating, non-productive delay in cooling. Requires no water cooling. **McDowell Electronics Inc.**, 150 Forrest St., Dept EP, Metuchen, N. J.

Check 146 Reader Service Card

P.C. DRAFTING AIDS Sec. 4100

Helpful 6-page reference chart for printed circuit draftsmen includes all of the pre-cut shapes and sizes of pressure sensitive drafting aids required to make paste-up printed circuit drawings to conform to MIL specs, together with many new non-military configurations. Also describes purposes of the several kinds of tape, black photographic, white, black on white and translucent red. **By-Buk Co.**, 4314 W. Pico Blvd., Dept EP, Los Angeles 19, Calif.

Check 147 Reader Service Card

VIDEO BAND RECORDER/REPRODUCER Sec. 4300

12-page brochure on Mincom CM-100 video band recorder/reproducer for recording and reproducing both analog and pulse signals. Single, standard size rack contains 7-track system covering an overall bandwidth of 400 cps to 1.0 mc on each track. Illustrated curves show greater bandwidth at lower speeds. Instantaneous selection of six speeds ranging from 7½ ips to 120 ips on single ½-inch tape. Mincom Div. **Minnesota Mining & Mfg. Co.**, 2049 S. Barrington Ave., Dept EP, Los Angeles 25, Calif.

Check 148 Reader Service Card

INSTRUMENTATION TAPE RECORDERS Sec. 4300

Bulletin 58 describes new 16-channel digital magnetic tape recorder, PS-216-D, including specs and illustrations. Bulletin 55 covers entire line of advance-design, transistorized, magazine-loading instrumentation tape recorders. **Precision Instrument Co.**, Dept EP, San Carlos, Calif.

Check 149 Reader Service Card

SILICON RECTIFIERS Sec. 4400

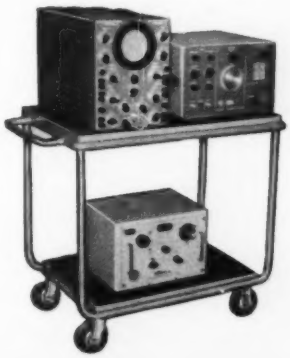
Bulletin SC1006 features silicon rectifiers for medium power applications up to 6 amperes. Bulletin SC1012 covers silicon rectifiers for similar use up to 12 amperes. The rectifiers, available in ½" hex ceramic insulated or ⅛" hex styles, are offered in eight PIV ratings from 50-600 volts. **Cornell-Dubilier Electric Corp.**, Semiconductor Div., Dept EP, Norwood, Mass.

Check 150 Reader Service Card

(Continued on page 33)

TECHNIBILT

MOBILE-IZES YOUR ELECTRONIC EQUIPMENT



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SCOPE CARRIER
MODEL OC-2
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TECHNIBILT CORPORATION
Glendale 1, California

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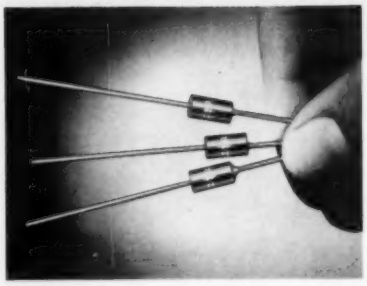
MINIATURE SILICON DIODES [*International Rectifier Corporation*]

eem File System electronic engineers master Sec. 4800



750 MA Rated, 200 To 600 PRV

Completely new diffusion techniques have resulted in this first of a series of miniaturized 750 ma rated diffused junction silicon diodes featuring low reverse current (200 μa) at rated PRV, a much higher than average surge current rating (50 amps peak, 1 cycle) and an exceptionally low forward voltage drop (0.92 volts) at rated current.

The new axial lead diodes are primarily designed for industrial and TV applications where miniaturization and high power handling capabilities are required. The complete series, designated Types X5A2, X5A4, X5A5, and X5A6, provides peak reverse voltage ratings of 200, 400, 500 and 600 volts, and an operating temperature range from −65°C to 130°C.

Each junction is encapsulated in a stable, high temperature, non-metallic case, resulting in a superior environmental seal. Typical units measure 0.29" x 0.20" diameter, excluding leads. Oversize silverplated copper leads insure optimum heat dissipation.

PRICE: $0.95 to $1.45; **AVAILABILITY:** On request
MFR: International Rectifier Corporation, 1521 East Grand Avenue, Dept EP, El Segundo, Calif.
SALES OFFICES: See **eem** p. 1615 (1960-61 Ed.)
OTHER PRODUCTS: See **eem** p. 1222

Check 100 Reader Service Card 6/60

MICROMINIATURE TRANSISTOR [*Philco Corporation, Lansdale Division*]

Will Permit 16 Times Greater Component Density Than Present Maximum

A new microminiature transistor small enough to permit component densities on the order of 1 million parts per cubic foot—approximately 16 times greater than present maximum component density—has been announced by this manufacturer. Illustration shows device compared with a standard TO-5 case.

The enclosure is a flat package measuring 0.125" wide, 0.180" long, and 0.06" high. About 42 enclosures can be mounted on one square inch multi-element wafer, and still add only about 1/16" to its thickness.

Designed specifically as a microelement for incorporation on a small wafer, the enclosure mounts easily into a slot in such wafers. The design features a cold welded, metal-to-glass, hermetically sealed package providing a minimum seal length of 0.05 inch. It will house any type of customer specified transistor. Electrical leads emerge from the enclosure in the horizontal plane, greatly simplifying connections to other components.

PRICE & AVAILABILITY: Contact Sales Offices below
MFR: Philco Corporation, Lansdale Division, Church Road, Dept EP, Lansdale, Pa.
SALES OFFICES: See **eem** p. 1658 (1960-61 Ed.)
OTHER PRODUCTS: See **eem** pp. 1330, 1331

Check 101 Reader Service Card 6/60

Additional New SEMICONDUCTOR PRODUCTS

Micro-Energy Switch is a transistor designed and constructed so that all internal device capacities are exceedingly small, while static characteristics of the device are optimized for operation at low collector voltages and collector currents. Results in transistor device for operation at the high repetition rates of high-speed switching transistors, but in circuits operating at much lower power levels. **PRICE:** Under $6.00; **AVAILABILITY:** About July 1, 1960; **MFR:** Philco Corp., Lansdale Div., Dept EP, Lansdale, Pa.; **SALES OFFICES:** See **eem** p. 1658

Check 175 Reader Service Card

High Frequency PNP Silicon Transistors, designed for I-F amplifier use, providing high operating voltage and high alpha cutoff frequencies; operating temperature range from −65°C to 200°C. Typical HF power gain for 2N1196 is 28 db at 4.3 Mc, and 22 db at 12.5 Mc for the 2N1197. **PRICE:** 2N1196, $21.80; 2N1197, $23.40; **AVAILABILITY:** Stock; **MFR:** Semiconductor Div. Hughes Aircraft Co., Dept EP, Newport Beach, Calif.; **SALES OFFICES:** See **eem** p. 1609

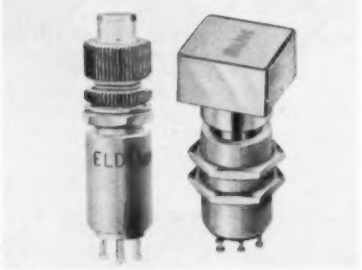
Check 176 Reader Service Card

Halltron Multipliers, designed for general purpose applications requiring high output voltage. Core material used in this new series of 5 units can be driven to linear flux densities of well over 10 kilogauss and consequently to hign Hall output voltage level. In addition, core material provides a reasonable dynamic range and low hysteresis. **PRICE:** $64.50 to $74.50 (1-4); **AVAILABILITY:** Stock; **MFR:** Ohio Semiconductors, Inc., 1205 Chesapeake Ave., Dept EP, Columbus 12, Ohio; **SALES OFFICES:** See **eem** p. 1651

Check 177 Reader Service Card

PUSH-TO-TEST SWITCHLITE [*Eldema Corporation*]

eem File System electronic engineers master Sec. 5100



Can Monitor Two Separate Circuits Without Common Connection

The 6AR push-to-test Switchlite (illustrated at the left) has the unique feature of having the lamp connected internally to the arms of a DPDT switch, enabling two separate circuits to be monitored without a common connection.

Ideal for fail-safe circuit applications, where isolation is needed between monitored circuit voltage and test voltage, the switch contacts are rated at 1 ampere dc, resistive load, with a life expectancy exceeding 100,000 operations.

The miniaturized 6B Switchlite (illustrated at the right) incorporates a replaceable high-brightness incandescent lamp with large plastic lens. A DPDT snap-action switch with extremely high current rating and long life is used in the unit. Maximum versatility is assured because all leads are brought out independently to turret-type terminals. The lamp and switch can then be used separately or in combination with one another for their fullest utilization. Lamps are available with ratings from 1.5 to 48 volts.

PRICE: 6AR: $3.79 ea, 6B: $12.66 ea. (Quantity discounts)
AVAILABILITY: 4-5 weeks
MFR: Eldema Corporation, 1805 Belcroft Avenue, Dept EP, El Monte, California
SALES OFFICES: See **eem** p. 1574 (1960-61 Ed.)
OTHER PRODUCTS: See **eem** p. 1104

Check 102 Reader Service Card 6/60

Additional New SWITCH PRODUCTS

One-Shot Switch-Circuit Assemblies, Series 1PB700 for pulse and digital electronic systems, generate a single square-wave pulse synchronized with a clock pulse at each operation, with pulse frequencies from 4 to 500 kc. Save space and design engineering time. All circuit components are sealed in resilient potting material. Used for manually loading magnetic drums, checking ring counters, resetting flip-flops, etc. **PRICE:** $46.00; **AVAILABILITY:** Stock; **MFR:** Micro-Switch Div. Minneapolis-Honeywell Regulator Co., Dept. EP, Freeport, Ill; **SALES OFFICES:** See **eem** p. 1640

Check 178 Reader Service Card

Rotary Limit Switch, Model 00-304, is an environment-free device providing a 10-ampere rating in a unit weighing less than 0.16 lb. Aircraft quality, the device offers SPDT single or double circuit control, DPDT four circuit control. Operating lever contains micrometer screw for infinite operating point adjustment, fixed by self-locking nut to insure repeatability. Unit offers a mechanical life well in excess of 20,000,000 cycles, plus exceptional shock and vibration resistance. **PRICE:** $38.50; **AVAILABILITY:** Stock; **MFR:** Licon Div. Illinois Tool Works, 6606 W. Dakin St., Dept EP, Chicago 34, Ill.; **SALES OFFICES:** See **eem** p. 1627

Check 179 Reader Service Card

Standard & Lighted Push Button Switches, Models SPS and LPS, feature nylon insert molded actuator for maximum ease of operation and long life. Depth behind panel is 2⅝" for standard, 4¼" for lighted. Wide choice of contact arrangements, light button pressure, smooth positive action. **PRICE:** SPS, $6.00 to $50.00; LPS, $12.00 to $95.00; **AVAILABILITY:** 2 to 3 weeks; **MFR:** General Control Co., 1200 Soldiers Field Rd. Dept EP, Boston 34, Mass.; **SALES OFFICES:** See **eem** p. 1592

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HIPOT EQUIPMENT AND INSULATION TESTERS

Use economical "H" series of testers for accurate, non-destructive testing of equipment, components, and materials. Features include high sensitivity and very low corona level. 5 microamp circuit breaker, deenergizes HV. Adjustable, 5 to 5000 microamps. Detects leakage of 200 megohms per KV. Dual output a-c and d-c. Many models to choose from up to 120 KV.

Free literature sent. Other dielectric, overvoltage, breakdown, corona, fault counter, continuity, and leakage testers available.

PESCHEL ELECTRONICS, INC.

Rt. 216, Towners, N.Y. (Putnam County) P.O. and Phone Patterson, N. Y. (TRinity 8-3251)

Check 30 Reader Service Card

NEW non-corrosive HYDRAZINE FLUX* ends residue problems on soldered joints, saves production time

HYDRAZINE FLUX leaves no rosin residue. New flux in water and water-alcohol solutions vaporizes completely at soldering temperature. Leaves no residue which would support growth of fungus. Will not corrode. Conforms to strict military requirements.

HYDRAZINE FLUX permits prefluxing. This means you can hold prefluxed parts before soldering—an efficiency measure that can increase manhour output substantially.

Ideal for soft-soldering a wide range of copper and copper-based alloys in electronic applications.

Test Hydrazine Flux in your own plant. Write for a sample of Hydrazine Flux and technical literature . . . for name of your nearest distributor.

*U.S. Patent No. 2,612,459

Available only from Fairmount and its sales agents.

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• Plant: Newark, N. J.

Check 31 Reader Service Card

TECHNICAL LITERATURE

(Continued from page 31)

TELEPHONE TYPE RELAYS **Sec. 4500**

Covering a complete line of telephone type relays, this 24-page catalog includes illustrations, specs and dimensional drawings of medium, small, miniature and sub-miniature types. Contact combination ranges include bifurcated, heavy duty and power. Also included are wide variety of hermetically sealed and microminiature crystal can types. **Magnecraft Electric Co.,** 3352 West Grand Ave., Dept EP, Chicago 51, Ill.

Check 151 Reader Service Card

TIME DELAY RELAYS **Sec. 4500**

Bulletin 359 illustrates and describes a new line of solid state time delay relays, economy series, for commercial, industrial and military usage. **Marstan Electronics Corp.,** 204 Babylon Tpke., Dept EP, Roosevelt, N. Y.

Check 152 Reader Service Card

R-STACK RESISTORS **Sec. 4700**

Bulletin R-40 describes new screw-mounted bushing terminated resistance elements which may be stacked together, available in decimal kit values and/or to specification. Typical applications include: multi-section voltage dividers; adjustable resistances with ohmic readout; resistance standards; trimmer resistances; miniature resistance decades. The units are non-inductively wire-wound, but are also available in carbon and metal film. **Consolidated Resistance Co. of America,** 44 Prospect St., Dept EP, Yonkers, N. Y.

Check 153 Reader Service Card

POTENTIOMETERS **Sec. 4700**

4- page summary brochure #5 contains information on 16 standard leadscrew actuated potentiometer models, including resistances, terminal types, power ratings, operating temperatures, and dimensions. **Bourns Inc.,** 6135 Magnolia Ave., Dept EP, Riverside, Calif.

Check 154 Reader Service Card

SOLID STATE ABSTRACTS **Sec. 4800**

Leaflet describes new technical abstracting service for solid state physicists and electronics engineers. Abstracts of papers on the theory, production, and use of solid state materials and devices (including semiconductors, magnetics, and dielectrics) are printed on 3"x5" index cards to provide a cumulative, multiple-entry index to the solid state literature. **Cambridge Communications,** 238 Main St., Dept EP, Cambridge 42, Mass.

Check 155 Reader Service Card

TRANSISTOR APPLICATION GUIDE **Sec. 4800**

This booklet indicates suitable transistor types for each major application. Transistors are classified in terms of one or two important parameters. Graphs and curves present information simply; data given by charts is intended to be reasonably typical of performance that has been obtained in practical circuits. Lansdale Div., **Philco Corp.,** Dept EP, Lansdale, Pa.

Check 156 Reader Service Card

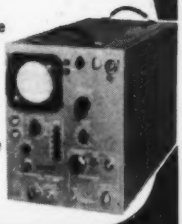
INSULATING TUBING & SLEEVING **Sec. 6000**

This 8-page catalog includes engineering data (including dielectric strength, temperature rating, flammability, and MIL specs, all in tabular form for easy reference) on this maker's complete Alphex tubing line. Product line consists of plastic tubing, plastic impregnated fibreglass sleeving, extruded plastic tubing, and silicon rubber fiberglass and varnish impregnated tubing. **Alpha Wire Corp.,** 200 Varick St., Dept EP, New York 14, N. Y.

Check 157 Reader Service Card

milli-μsec instruments for *every* fast rise time application

MODEL 112 MILLIMICROSECOND OSCILLOSCOPE
Fastest, most sensitive sampling oscilloscope. Risetime 0.4nsec, sweep rates to 0.05 nsec/cm. Sensitivity 3mv/cm (w. 30:1 SNR at F.S.) Trigger rates to 300mc (optional). High & low impedance inputs.



MODEL 510 DIODE RECOVERY TEST SET
Generates mus diode recovery curves on ordinary oscilloscopes. Includes pulse generator, current supply, diode fixture, sampling converter & delay unit.

MODEL 222 SAMPLING CONVERTER
For viewing mus waveforms on ordinary oscilloscopes. R. T. 0.6ns, sweeps to 0.5ns, rep rates to 300mc. Shown with Model 1201 delay unit.

MODEL 503 DIODE RECOVERY TEST SET
Consists of 0.3ns pulse generator, metered current supply, distortion-free diode fixture.

MODEL 303 PULSE GENERATOR
R. T. 0.3ns; fast, variable rep rates; calibrated pulse widths and amplitudes.

ACCESSORIES FOR MODEL 112 & 222.

MODEL 610 HIGH IMPEDANCE PROBE
200K shunted by 2.4 uuf

MODEL 620 TRIGGER AMPLIFIER
For triggering from fast, low level pulses (less than 20 mv, 1ns)

MODEL 1660
Low capacity circuit probes, 0.6uuf Up to 5000 Ω

Write for complete specifications & free millimicrosecond data chart

Lumatron electronics

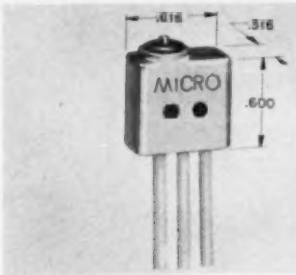
Dept. EP 116-120 County Courthouse Rd. New Hyde Park, L. I., N. Y. • Pioneer 7-3200

Check 32 Reader Service Card

New Products of the Month

ENVIRONMENT-FREE SUBMINIATURE SWITCH [*Micro Switch Div. Minn.-Honeywell*]

eem File System Sec 5100



0.616" x 0.6" x 0.316" — Weighs Only 0.2 Ounce

A new environment-free subminiature switch that is claimed to be the smallest and lightest available was announced by this manufacturer.

Measuring only 0.616" x 0.6" x 0.316", and weighing only 0.2 ounces, the sealed 1XE1 switch combines miniaturization with reliability for mobile, marine, aircraft, and railway applications. The tiny switch is 30% smaller and weighs 20% less than any previous environment-free switch and combines its new size with more than ample electrical capacity, meeting the pressing demand for miniaturization combined with reliability.

The switch mechanism and extending leadwires are embedded in an epoxy resin inside a treated corrosion-resistant aluminum housing. An elastomer seal around the plunger prevents dust, dirt, or moisture from getting inside.

The single-pole double-throw switch will operate in ambient temperatures from —65 to 230°F. Its electrical rating is 4 amperes inductive, 28 vdc, and 5 amperes at 115/230 volts, 60 cps. Leadwires are available in 1-, 3-, 6-, and 12-foot lengths.

PRICE: $8.00, List; **AVAILABILITY:** 4 weeks
MFR: Minneapolis-Honeywell Regulator Co., Micro Switch Division, 7 West Spring Street, Dept EP, Freeport, Illinois.
SALES OFFICES: See **eem** p. 1640 (1960-61 Ed.)

Check 103 Reader Service Card 6/60

TRANSISTORIZED TEMPERATURE CONTROLS [*Fenwal, Inc.*]

eem File System Sec. 5300

Transistorized Temperature Detectors, Controllers, And Indicators

By employing interchangeable printed circuit boards, several models of these temperature controls are available with a variety of modifications.

The Series 536 Unit Controller covers a temperature range from —50 to 600°F, with a sensitivity of 0.3°F and current handling capacities of 10 amperes at 110 vac, and 5 amperes at 230 vac.

When the Series 536 is adapated for indication, it is used with the Series 580 Indicator. This is a panel mounted unit, and can handle one to ten of the Unit Controllers, Series 536.

The Series 561 (illustrated) is a transistorized single point ON-OFF temperature indicator and controller with an optional proportioning circuit. It covers the range from —50 to 600°F.

For those applications where only temperature indication is required, the Series 582 is offered. The Model 582 is essentially a thermometer using thermistor sensing probes. It is conveniently adapted to indicate temperatures at one to ten points, and has a selector switch to read the exact point desired.

PRICE: $40.00 to $60.00; **AVAILABILITY:** 4 weeks
MFR: Fenwal, Inc., Pleasant Street, Dept EP, Ashland, Mass.
SALES OFFICES: See **eem** p. 1585 (1960-61 Ed.)

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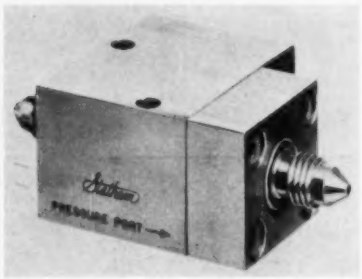
PRESSURE TRANSDUCERS [*Statham Instruments, Inc.*]

eem File System Sec. 5500



Permit Easy Stacking For Maximum Use Of Space

Easily stacked for maximum use of space, these new subminiature pressure transducers, Series 295, include absolute, gage and both bi- and unidirectional differential pressure transducers. The units provide the performance, accuracy, and economy of this manufacturer's unbonded strain gage principle.

The absolute pressure transducers have a range of 0-5 to 0-5000 psia. With 7 volts dc or ac excitation, they provide a 42 to 56 mv nominal output. Gage pressure transducers range from 0-5 to 0-5000 psig. They are rated for 5 volt dc or ac excitation and have a nominal output of 30 to 40 mv. Bi-directional differential pressure transducers vary from ±2.5 to ±25 psid.

They are rated for 5 volts dc or ac excitation and furnish a ±20mv nominal output. Uni-directional differential pressure transducers have a 0-5 to 0-1000 psid range. Their output is 40 mv at 5 volts dc or ac excitation. The weight of each unit is approximately 4 ounces.

PRICE: $270.00 to $310.00;
AVAILABILITY: Stock to 8 weeks
MFR: Statham Instruments Inc., 12401 West Olympic Boulevard, Dept EP, Los Angeles, Calif.
SALES OFFICES: See **eem** p. 1691 (1960-61 Ed.)
OTHER PRODUCTS: See **eem** p. 1398

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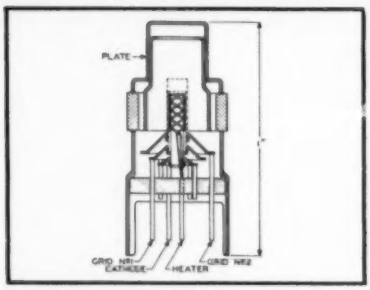
NUVISTOR SMALL-SIGNAL TETRODE [*Radio Corporation of America, Electron Tube Div.*]

eem File System Sec. 5700



1/3 Size Of Conventional Tetrodes—Developmental Samples Available

Developmental nuvistor small-signal tetrodes are now available from this manufacturer. Extensive tests in their tube application laboratory indicate that the nuvistor tetrode will provide excellent performance in mixer and i-f amplifier stages of electronic equipment.

In designing the nuvistor tetrode, the engineers had as their objective a tube which would give superior performance in a variety of applications, particularly at the higher frequencies. The nuvistor tetrode is one-third the size of the conventional radio-frequency amplifier tetrodes, and consumes approximately one-half as much heater power.

Some of the many advantages of the unique nuvistor method of construction are: extremely small size; dramatic improvements in quality, performance, reliability, and flexibility of installation; elimination or minimization of many of the known causes of tube failure; use of only ceramic and metal, providing an extremely rugged structure; and brazing of all connections.

PRICE: About $14.00
AVAILABILITY: Sample quantities from stock
MFR: Radio Corporation of America, Electron Tube Div., 415 S. Fifth St., Dept EP, Harrison, N. J.
SALES OFFICES: See **eem** p. 1668 (1960-61 Ed.)
OTHER PRODUCTS: See **eem** p. 1451

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Additional New ELECTRON TUBE PRODUCTS

Ignitron, Type 7585, features a unique spiral cooling coil so distributed as to concentrate cooling action around the discharge chamber to promote condensation at bottom of tube, thus reducing problem of arcback. Type 7585 has been designed for single phase welding control and similar applications; completely compatible and interchangeable with existing C-sizes. **PRICE:** OEM, $78.95; **AVAILABILITY:** Stock; **MFR:** Amperex Electronic Corp., 230 Duffy Ave., Dept EP, Hicksville, N. Y.; **SALES OFFICES:** See **eem** p. 1525

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5¼-Inch Cathode Ray Tube, Type K1931, permits high frequency operation and sensitivity for general purpose oscilloscopes. K1931 claimed to be first 5" type tube with linear post-acceleration for use in low frequency instrument. Operates at screen voltages of 5,000 volts with deflection factors of 25 to 35 v/in for both sets of deflection plates. **PRICE:** $50.00 with P1 or P2 phosphors, $56.50 with P7 or P11; **AVAILABILITY:** 8 weeks (sample quantities); **MFR:** Electronic Tube Div. Allen B. Du Mont Labs. 750 Bloomfield Ave., Dept EP, Clifton, N. J.; **SALES OFFICES:** See **eem** p. 1569

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Storage Cathode Ray Tube, Type FW-211, 2½" "Iatron," produces bright visual display for direct viewing of electrically stored information. Incorporates CR gun for electrical signal input, insulator mesh for beam charge storage, flooding gun for viewing and erasing, and an aluminized phosphor 1⅞" viewing screen for visual output. Features bright daylight viewing, display exceeds 4000 foot-lamberts, viewing screen voltage only 8500 volts. Writes, stores and erases at will. **PRICE:** $1665.00 (1-5); **AVAILABILITY:** 30 days; **MFR:** ITT Laboratories, Dept EP, Fort Wayne, Ind.; **SALES OFFICES:** See **eem** p. 1611

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2				27				52				77				102				127				152				177				202				227				252				277			
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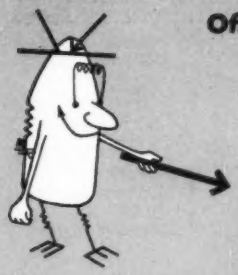

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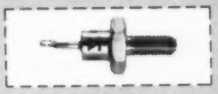
1N536	50
1N599	50
1N599A	50
1N1217	50
1N440B	100
1N530	100
1N537	100
1N600	100
1N600A	100
1N1100	100
1N1218	100
1N601	150
1N601A	150
1N1219	150
1N441B	200
1N531	200
1N538	200
1N602	200
1N602A	200
1N1101	200
1N1220	200
1N442B	300
1N532	300
1N539	300
1N603	300
1N603A	300
1N1102	300
1N1221	300
1N443B	400
1N533	400
1N540	400
1N604	400
1N604A	400
1N1103	400
1N1222	400
1N444B	500
1N534	500
1N605	500
1N605A	500
1N1104	500
1N1223	500
1N445B	600
1N535	600
1N547	600
1N606	600
1N606A	600
1N1096	600
1N1224	600
1N1225	700
1N560	800
1N1226	800
1N561	1000



STUD MOUNTED SILICON RECTIFIERS

E.I.A. Number	*PIV*
1N607	50
1N607A	50
1N340	100
1N338	100
1N349	100
1N348	100
1N347	100
1N253	100
1N608	100
1N608A	100
1N609	150
1N609A	150
1N336	200
1N337	200
1N346	200
1N345	200
1N254	200
1N610	200
1N610A	200
1N334	300
1N335	300
1N344	300
1N343	300
1N611	300
1N611A	300
1N332	400
1N333	400
1N342	400
1N341	400
1N255	400
1N612	400
1N612A	400
1N613	500
1N613A	500
1N256	600
1N614	600
1N614A	600
1N562	800
1N563	1000

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Complete data on Types 131D and 132D Capacitors is given in Engineering Bulletin 3710A. Write Technical Literature Section, Sprague Electric Company, 479 Marshall Street, North Adams, Massachusetts.

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